

THE IRON AGE

Established 1855

New York, October 2, 1913

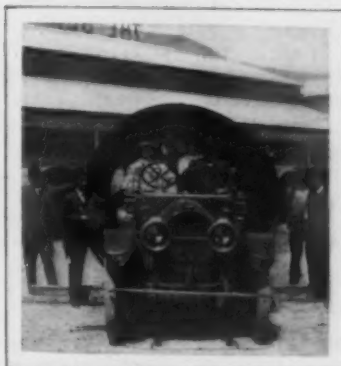
Vol. 92: No. 14

Riveted Pipe Works at South San Francisco

Plant of the
Company Making
of Plates and

One of the largest manufacturers of riveted pipe on the Pacific Coast, equipped to handle tank, pipe and other work requiring material ranging from No. 24 gauge galvanized iron to and including 1½-in. plates is that of the Schaw Batcher Company, located at South San Francisco. To give some idea of its interesting arrangements, the accompanying plan has been sketched and a number of photographs have been reproduced.

The plant covers 5 acres of ground on the east side of the main line of the Southern Pacific Railroad. It comprises a main building parallel to the railroad, with a spur track for the receipt of material and the despatch of finished products, and at opposite ends of



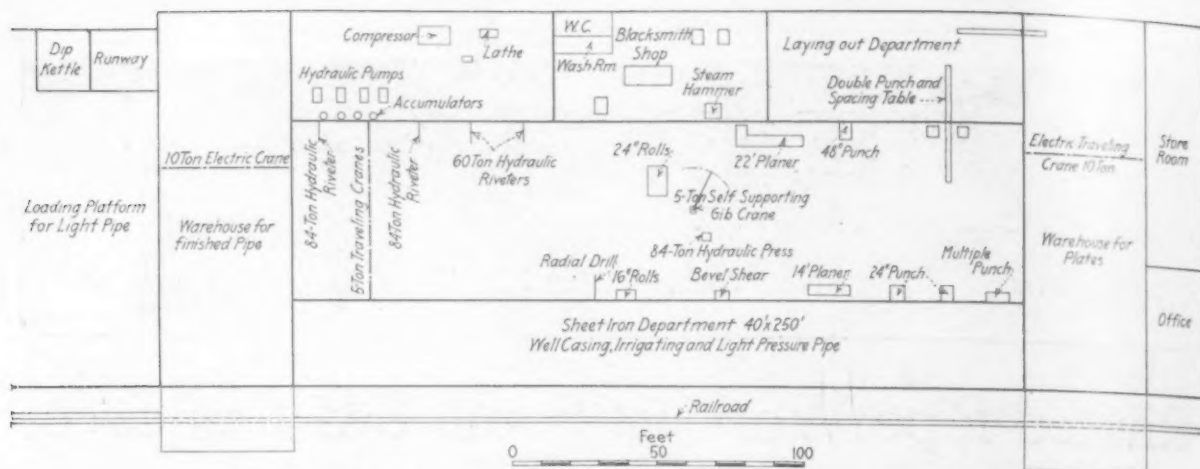
Seven-Passenger Automobile Coming Through Section of 102-in. Pipe

Schaw Batcher
Piping and Tanks
Galvanized Iron

the main building a north and a south building at right angles to the tracks and each extending over the spur track. One of these end buildings, the south building, is used for the storage of the steel plates, while in the other the material is finished and loaded on cars for shipment. The main building contains all the machinery in its main or central portion, which is 60 ft. wide. It is 250 ft. long, as are the east and west bays, the former 30 ft. wide, devoted largely to laying out operations, and the west bay, 40 ft. wide, given over chiefly to making sheet metal products. The spur track is 800 ft. long, giving ample space for loading and unloading cars alongside the west bay as well as in the north and south buildings, through



The Plates Are Carried by an Overhead Crane from Cars Entering the Building at the Left to the Different Storage Piles and Thence Are Taken by Cranes to the Fabricating Shop at the Right, Reaching at the Far End the Shipping Department. At the Right May Be Seen the Double Punches Operated in Connection with a Spacing Table



Map of the Buildings and Arrangement of the Machinery

which the siding passes, as shown in the map of the shops.

Crane facilities are of course important in a plant requiring the handling of heavy objects. Through the center of the main building there are five overhead cranes of 40-ft. span with a clearance of 25 ft. from the floor level. These crane runways are hung from the roof trusses and vertical columns extend below the level of the runways to support a supplementary runway in each case. This with a runway on the adjoining line of columns form the support for what may be called traveling trucks of 10-ft. span. The truck runways have a clearance of 14 ft. and likewise extend the full length of the building with six trucks on each of them. They are intended to support material under operation at the different machines. In addition to the trucks, swinging booms are installed at different machines to take care of extra long sheets under construction. Both the south and the north building are provided with a 10-ton electric traveling crane serving the entire building area, which is 48 x 160 ft., and also the spur track. In general the cranes have pneumatic hoists of 5 to 10 tons capacity each.

In the course of construction, the plates are taken from the south or plate storage building by the overhead crane and placed on a small flat car. They enter at the extreme end of the east bay, where they are picked up by another crane and placed on a spacing table and run through a double punch, one opposite the other. After punching for the roundabout joints, the longitudinal laps are marked and punched on single punches. The plates then pass to the planers or bevel shears to have the edges trimmed. The ends are then crimped under an 84-ton hydraulic press and swung over to a steam hammer to have the corners scarfed out to a feather edge. They are then ready to be rolled into shape and the capacity of the rolls

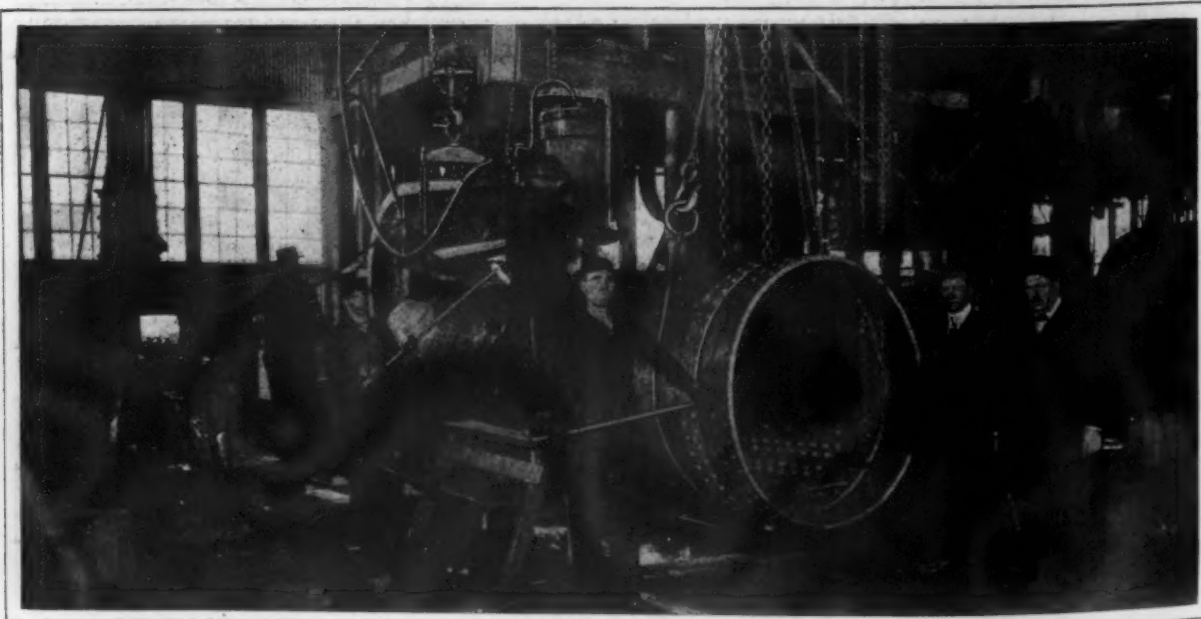
is 1½-in. plate. The plates, being rolled into shape, are riveted up on the longitudinal seams by horizontal hydraulic riveters. There are two of these riveters, each of 60 tons rating. The pipe is then assembled into sections ranging in length from 8 to 30 ft. The girth seams are riveted by horizontal hydraulic riveters, of which there are two, of 84 tons each. After this operation the sections are dropped in the north shop, where they are calked and painted and made ready for shipment.

In the east bay of the main shop is located the laying-out floor, the blacksmith shop and machine shop. The west bay is devoted entirely to the manufacture of sheet iron pipe, well casing, smokestacks, dredger pipe and light sheet-iron tanks.

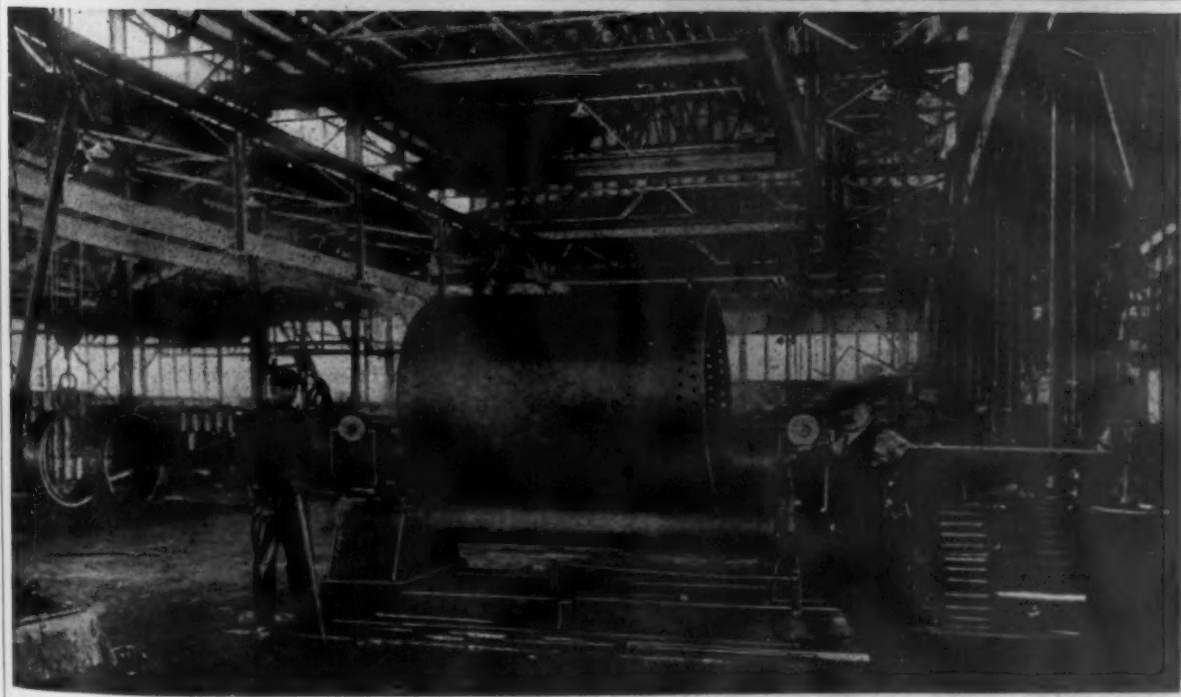
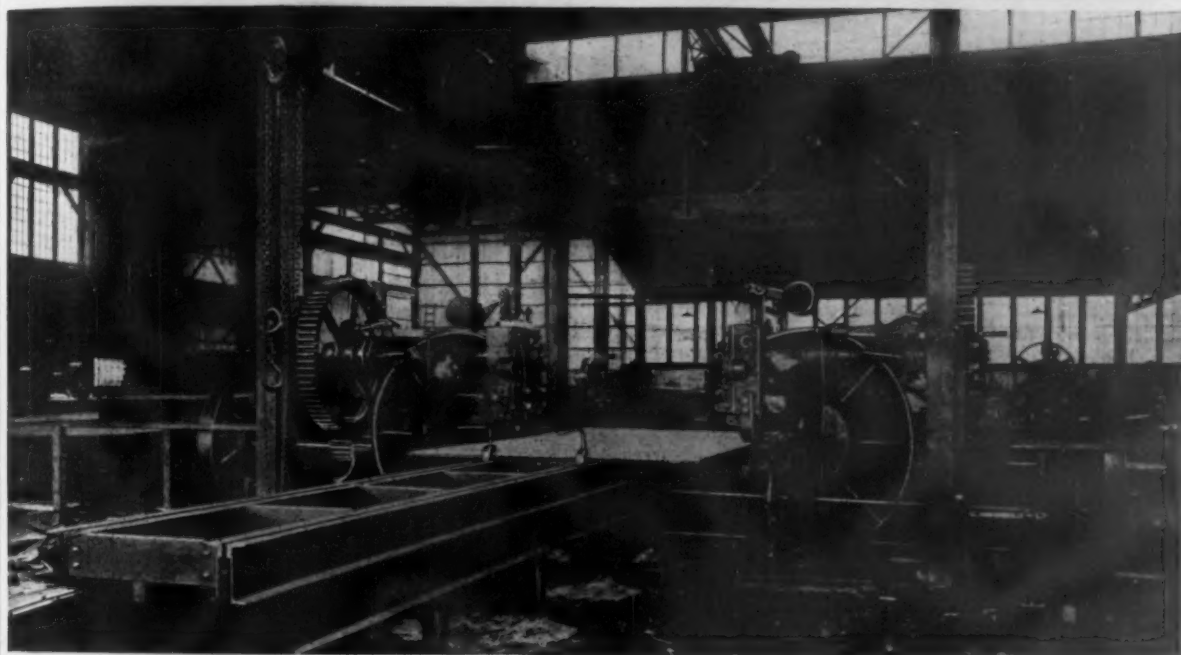
Air for the hoists, riveting and calking hammers and drills is furnished by a two-stage Franklin belt-driven compressor having a capacity of 619 cu. ft. of air per minute, with a final air pressure of 100 lb. In connection with the belt-driven compressor there is installed an auxiliary steam plant for emergency purposes.

The four hydraulic riveters are operated in connection with accumulators, each riveter having its own accumulator. The accumulators have the usual disks, allowing any number to be used, regulating the pressure to the requirements of the work. Each accumulator is connected to a double-acting belt-driven hydraulic pump. The pumps are connected by a valved manifold allowing pumps to operate with any accumulator. All the machines throughout the shop are direct connected, and the total power to run the plant is 400 hp.

A great deal of attention has been given to the lighting system of the plant, controlled from the switchboard in the engine room, which is in the east bay of the main building. Mazda lamps were installed with Holophone



Riveting with an 84-ton Riveter Capable of Driving 1½x6-in. Rivets



Lighting in the Main Shop Looking Toward the Shipping End.
Double Cleveland Punches and the 56-ft. Spacing Table with Plate Storage at Left.
Plate $1\frac{1}{4}$ in. in Thickness Being Rolled for 52-in. Pipe.

D'Olier porcelain enamel steel reflectors and range in size from 150 to 500 watts.

The specialty of the Schaw Batcher Company, which has offices at 356 Market street, San Francisco, is high-pressure riveted-steel pipe. It also manufactures oil storage, cyanide and pressure tanks, gas holders, oil heaters, boilers, well casing and irrigating, air and light sheet iron pipe. At the present time the shop is working day and night shifts completing a contract of 5000 tons of pipe for the Pacific Gas & Electric Company for the Drum power house project, the pipe varying from 52 to 102 in. in diameter and from $1\frac{1}{4}$ to $\frac{1}{4}$ in. in thickness.

Two New Osborn Molding Machines

Roll-over and Squeezer Products to Be
Shown in Coming Chicago Exposition

Two new molding machines have been added to the line made by the Osborn Mfg. Company, Cleveland, Ohio, and will be shown for the first time at the convention of the American Foundrymen's Association in Chicago. One of these is an entirely new type of roll-over machine that is of special interest because of its new features and simplicity, and the claim that the cost of production can be largely reduced by the rapidity with which molds can be made on it. This is the upright machine illustrated in Fig. 1. The flask or core box is filled, rammed, rolled over and the pattern drawn without the operator leaving his position in front of the machine, thus eliminating the walking around from one end to the other required in old types of machines. During the entire operation there are no stops or locks to manipulate. Rolling over the mold requires the minimum effort as it revolves on its own center of gravity. As most of the weight is slightly above the center of gravity the weight helps to carry the mold over, but does not bring it down with a jolt as the cam shown at the right of the roll-over table brings it to a gradual stop at the proper position. A screw shown in the

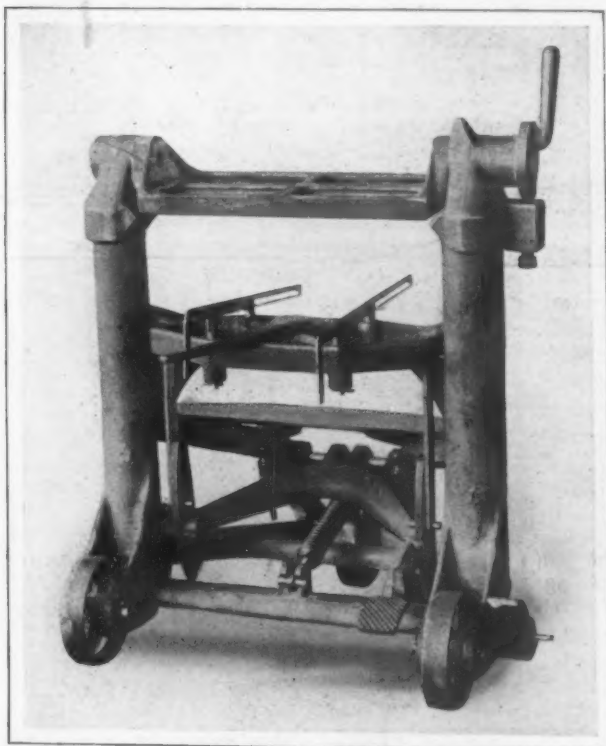


Fig. 1—A Recently Developed Molding Machine of the Roll-Over Type

illustration provides an adjustable contact point against the cam so that the desired pressure can be secured.

The mold or core is rammed by hand or foot power or by both. The jolting is accomplished by depressing a second foot treadle shown at the right. This connects with a shaft extending from one side of the machine to the other, to which is fastened a lever making contact with pins extending through the frame of the machine to the trunnion head. The operation of this treadle takes little



Fig. 2—A Portable Pneumatic Squeezer Machine with the Flask Mounted

effort and does not require the molder to move from his position. It is stated that most core boxes can be sufficiently rammed by two or three jolts and that the ramming of many small molds can be largely expedited by a similar amount of jolting.

After the flask is rolled over a slight pressure of the foot on the treadle releases a catch and the mold receiving table is raised into position. The table is equipped with the builder's four-pin leveling device which adjusts itself to any unevenness of the bottom board. These pins are locked simultaneously by pushing the lever a few inches to one side. An interesting feature of the table is that the counteracting spring is so located that a uniform pressure on the foot treadle is obtained throughout the stroke.

The table is lowered and the core or the mold is drawn by pressing the foot treadle a second time, giving a straight gravity drop. The mold is then pulled forward clear of the machine by the sliding arms which pass through slots in the leveling pins. Various working parts are inclosed to keep out grit and sand. The machine is made in three sizes, 22, 26 and 36 in. between trunnions and each with an 8-in. pattern draw. The two larger sizes are so designed that the pattern plate can be rocked out, thus securing additional draw if needed.

The other molding machine is an air squeezer, which is a substantially built machine on wheels that can be easily moved along the foundry floor. As will be seen from Fig. 2, this machine is designed to permit the free shoveling of sand from beneath it. An important feature of this machine is that the valve can be adjusted to any desired pressure from 30 to 100 lb. per sq. in., making it to a certain extent automatic in operation. As soon as the desired compression is reached the valve not only prevents additional pressure, but signals the operator by the hiss of escaping air that the mold is finished. He then removes his hand from the valve and the machine automatically turns to its off position. This valve regulator makes it unnecessary for the molder to watch the gauge to see when the right pressure is reached. After a mold is squeezed with the desired pressure duplicate molds can be made of similar hardness by setting the valve at this figure. Speed can be readily controlled by the operator increasing or decreasing the amount of air.

The machine is strong and substantial in construction, but very simple. The maximum strength is gained without unnecessary weight by having strain rods of nickel steel, thus combining lightness with strength. These rods are directly connected to the cylinder casting, thus eliminating all tendency to spring the machine when in operation. Another advantage claimed for the machine is that the table is cast with a shield or apron which incases the working parts, coming down around the cylinder for a distance greater than the length of the ordinary stroke so that the working parts are not exposed to sand or dust. The machine is furnished complete with side table, riddle

bracket, parting bag and sponge pockets and blow valve with hose connection. Knee valves and vibrators are furnished extra.

The machine is built in three sizes with 10, 13 and 16 in. cylinders and 32, 36 and 42 in. between rods. The largest size is built without a wheel base.

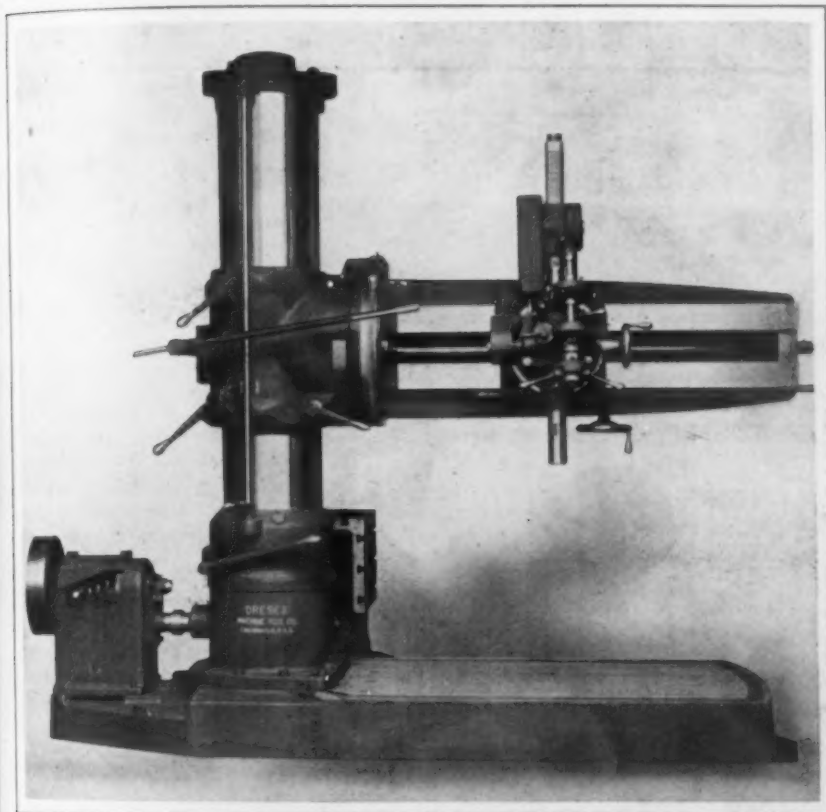
Improved 6-Ft. Radial Drilling Machine

A 6-ft. universal radial drilling machine, possessing as its special features a new design of arm girdle and a somewhat novel type of feed mechanism, has been brought out by the Dreses Machine Tool Company, 227 West McMicken avenue, Cincinnati, Ohio. In the construction of this machine, all of the builder's standard features, such as the double webbed arm, the friction tapping and reversing

base of the head which can be completely revolved, and is graduated for angular setting. The gearing, which is entirely covered, is readily accessible. The spindle is balanced by a weight, which travels only about two-thirds of the range of the spindle movement, a compound pinion arrangement being used. There are 21 spindle speeds available. The quick advance and return device has two handles, either of which engages and disengages the feed instantly. The feed mechanism is of quite a novel design. Planetary gearing and a pinion cut directly on the feed shaft causes the dial plate on the feed shaft to make a quarter of the revolution of the shaft. On the dial plate there is a fixed dog which acts upon a lever in connection with a clutch and automatically stops the feed. There are eight changes in all. There are four steps in the series, and these are regulated by the small handle at the left side of the feed shaft, while the horizontal handle above the handwheel doubles them.

The initial driving and speed mechanism is located in the rear of the arm girdle, which, it is pointed out, greatly simplifies the construction, as compared with one where all the mechanism is located on the traveling head. The back gears, which are of the automobile transmission type, have three changes and are shifted by a small lever in front of the girdle. The tapping, starting and reversing mechanism is of the friction type, which was described in *The Iron Age* October 26, 1911, and is operated by a long, telescopic lever, which is always in reach of the workman. The speed variator is of the well-known tumbler type and has seven changes. A self-releasing overtake clutch is used and the machine always runs at the slowest speed to decrease the momentum while changing. All of the gears, which are of hardened steel, run in an oil bath, and the teeth are of the 20-deg. involute pointed form. The pulley shaft has an annular ball bearing to reduce the friction.

This machine is also built with 4 and 5 ft. arms and can be furnished with either the cone pulley, adjustable-speed motor or speed variator drives.



A New Design of 6-Ft. Radial Drilling Machine. The Complete Line Includes Machines with 4 and 5 Ft. Arms

mechanism, and the tumbler type speed variator, have been retained.

As will be noticed from the accompanying engraving, the base is comparatively high with an oil groove extending entirely around it. This groove drains into the side ear under the table. The base is strongly reinforced by internal ribbing. The column construction is of the well-known double type, and the outer one swings on the inner fixed column, which extends entirely to the top. Both members are enlarged at the lower end, thus, it is pointed out, increasing their strength and providing a means for a large roller bearing and firm and easy clamping. Reliance is placed upon an annular ball bearing at the top of the inner column to insure easy movement of the arm, while the clamping handle follows the arm and is always within reach of the operator. The arm, which is of the double webbed type, is reinforced by ribbing. A shoe attached to the saddle, which fits and slides between the two faces, combines them into a solid box when clamped. The arm is raised at twice the speed at which it is lowered, and automatic knock-outs are provided at the top and bottom to prevent breakage. One of the special new features of the machine is the design of the arm girdle. The socket which receives the arm is placed very far to one side, with reference to the column center, so as to permit a long central shaft in the head saddle, and also to bring the spindle closer in line with the center of the column.

The saddle is reinforced on the face to receive the

The American Blower Company, Detroit, Mich., has purchased the entire air washer interests, including patent rights, of the McCreery Engineering Company, formerly of Toledo, Ohio, and later of Detroit. The McCreery Company enjoyed a high reputation as the manufacturer of efficient air purifying apparatus. Its earlier efforts were almost exclusively confined to marine work, later entering the general ventilating field. The McCreery purifying, cooling and humidifying equipment will hereafter be exclusively manufactured and sold by the American Blower Company under its trademark Sirocco.

The Cleveland Castings Pattern Company, Cleveland, Ohio, has recently shipped three full separate carload lots of metal patterns for stoves and boilers. The buying of metal patterns in such large lots is unusual, and the railroads found that they had no rates for carload lots. The Interstate Commerce Commission was appealed to and it was found that this commission had established no carload rates, so that it was necessary to pay the maximum rates. The carload shipments included aluminum match plates, brass master patterns and iron working patterns.

The Babcock & Wilcox Company has been awarded the contract for Sterling boilers and the Westinghouse Electric & Mfg. Company the contract for generators and turbines for the municipal lighting plant in Barberton, Ohio.

Provisions for Employees in a Hartford Plant

Large Eating Halls a Feature of the Works of the Underwood Typewriter—Sanitation Measures—Emergency Hospitals

BY JAMES STEDMAN

As an example of an interesting development of the provision of conveniences for employees may be cited the welfare work of the Underwood Typewriter Company at Hartford, Conn. This concern employs between 3000 and 4000 men and women at its works, and turns out 500 typewriting machines per working day.

First of all, the company furnishes two large rooms having dimensions of 50 x 365 ft. and of 50 x 88 ft., as

according to their contents, for 25, 50 or 100 cents. These are used in payment. A special menu card is issued for each day, and becomes available ahead of time, so that each person may make out his card early in the morning of the preceding day. In making out the card, he draws a line through each item desired. He himself has a certain number and also his seat at table. These numbers are written on the card at places reserved for the purpose. On



Employees May Order Their Midday Meal a Day in Advance and Only the Hot Dishes Need Be Served After Their Arrival. At the Left is the Trolley Carrier of Individual Sealed Milk Glasses

dining rooms. The larger one is equipped with stationary tables and revolving seats sufficient to accommodate 1300 men at one time. The seats are furnished with backs. The other, the women's dining room, seats about 400 at once. The company furnishes the general equipment necessary, such as utensils, ranges, glassware, crockery ware, etc. A caterer is in charge. He provides cooks, waiters, etc., and supplies the foodstuffs. Relieved of such expenses as those involved in rent, equipment, etc., the caterer is able to provide substantial and wholesome food at exceedingly low rates. Thus for 10 cents, a good lunch can be obtained. The hot or cold drink will cost 2½ cents; the stew or other substantial portion, 5 cents; and a dessert 2½ cents.

The method of making provision for a large number of persons and at the same time suiting their individual tastes is quite an efficient one, even from the point of view of economy. A book or package of stamps is sold to the patron. These are made up of 2½-cent stamps and sell,

the back of the card, he pastes the stamps necessary to pay for the meal ordered. These cards, thus filled out and stamped, are put into a kind of letter box provided for the purpose of their reception. The caterer is thus able to determine with some degree of certainty the amounts necessary to fill the orders. It is evident that such a method enables considerable economy to be practiced. The writer understands that waste is small.

The patrons of the dining rooms come in very promptly at noon. The waiters will have previously placed at each seat the cold articles ordered; hot articles are served just before the employees enter or afterward. So perfect are the arrangements and the discipline that there is probably no more noise than at the regular quick-service public restaurants. Indeed, the men and girls are permitted to remain in the dining rooms after the meal is completed.

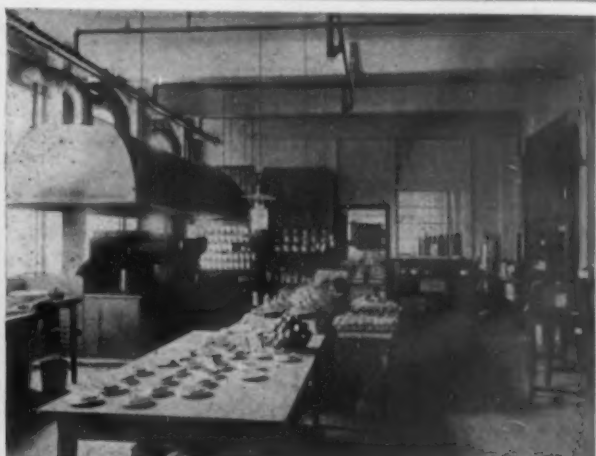
A large tray about 3 x 8 ft. in area is hung from wheels running overhead, on a single rail. In this way, a great deal of the food may be brought to the immediate

vicinity of the point in use. Thus, this device is especially convenient in connection with the distribution of the milk. This drink is served in a specially formed individual glass in which it has been kept since morning when the supply was obtained. Each glass is protected by a paper seal.

viding a means of filling the empty glasses supported by the perforated metal sheets. The cooling bath is simply a body of water surrounding the glasses, in which there may be a few pieces of ice. The water is continuously run in and out of the tank. Meats and other articles are



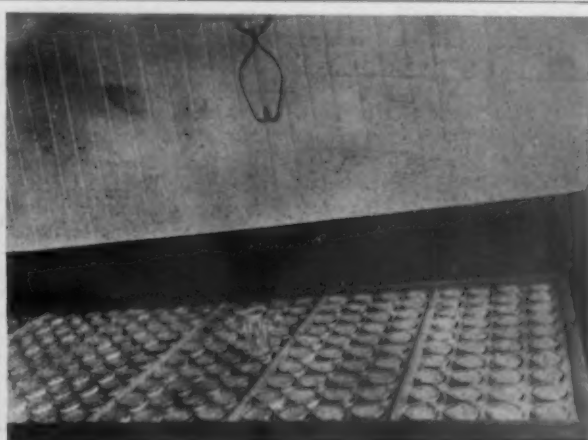
How the Dining Room is Patronized



The Kitchen with the Serving Arrangements



Caring for Disinfected Sawdust-Filled Cuspidors



The Milk is Kept Cool in Water



Distributing and Collecting the Cuspidors



The Women's Emergency Hospital; One Also for Men

The glasses are flat bottomed cylinders with an annular outer flange around the top. The object of the flange is to provide a means of support when the glasses are put into their holes arranged in a metallic sheet over a cooling bath. When the milk is delivered in the morning, a large receptacle full of it is swung by a suitable hook arranged over the cooling tank. At the bottom of the receptacle a short rubber hose may be attached, thus pro-

preserved in a special cooling room. The kitchen is large and commodious, and is kept quite clean.

Probably 40 per cent. or more of the entire body of employees patronize the dining rooms. The caterer thus has a large and reliable volume of business. On rainy days, the patronage is increased. However, an employee may use the dining room without being compelled to purchase food or drink. That is to say, he may eat in the din-

ing room a home-prepared lunch. He may buy a glass of milk or a cup of coffee to go with it; or he can omit all purchases. Of course, those who patronize the caterer only on rainy days and the like will have to be content with the articles available. Those, however, who order ahead, get just what they want.

While attention is chiefly directed to the arrangements for dining at the works, there are two emergency hospitals. One for the women has two beds and is in charge of a special attendant. A telephone supplies the means for summoning a physician when necessary, and a medicine chest, etc., for taking care of ordinary cases. Usually, the physician is not required. The hospital arrangements are good.

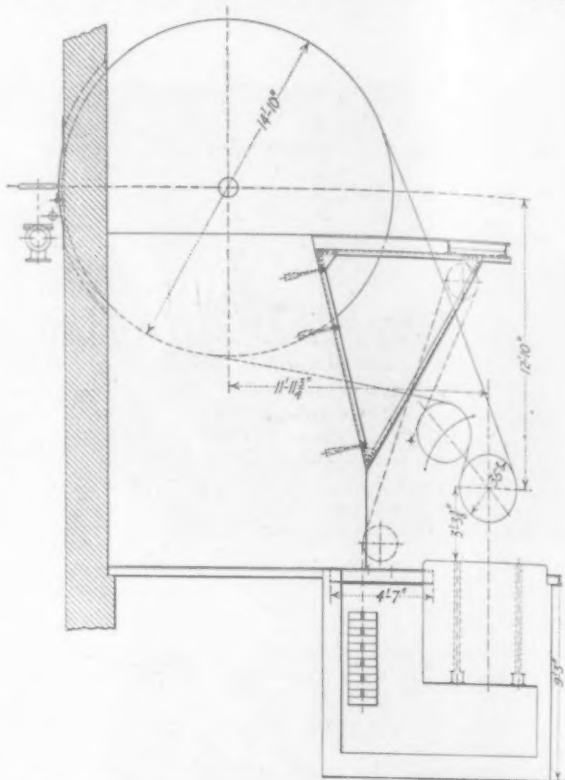
Belt Transmission of 740 hp. in Close Quarters

Application of the Lenix System with
36-In. Belt and Shafts 171-2 Ft. Apart

An interesting case of the transmission of a large amount of power in close quarters with a speed reduction of 5 to 1 is shown in the accompanying reproduction of a photograph taken in one of the largest woolen and spinning mills in Europe. It is an application of the Lenix drive, with a double leather belt 900 mm. or 36 in. wide. The photograph was obtained from the Charles A. Schieren Company, New York, which made the belt.

A sketch of the elevation of the transmission system has been drawn and will serve to explain the problem. It will be noted that the driving shaft is nearly 13 ft. below the driven shaft, and that the latter is off-set as regards the necessary location of the driving shaft a distance of almost 12 ft. This places the two shafts parallel to each other at a distance of 17 ft. 6 in., and to transmit the required amount of power with the speed reduction desired, the Lenix drive was installed. This, of course, comprehends the use of an idler held against the belting to secure the desired arc of contact. It will be noted that the Lenix pulley is hung by means of two link belts or chains, running over sprockets hung from the balcony shown above the driving shafting, and the free ends of these chains carry a series of weights, hanging in pits below the floor level, so that the upward pressure or position of the Lenix idler may be as desired, depending upon the power to be transmitted and therefore the arcs of

contact between pulley faces and belting. According to the sketch, it would appear that the arc of contact of the driving pulley is about 215 deg., and that of the driven



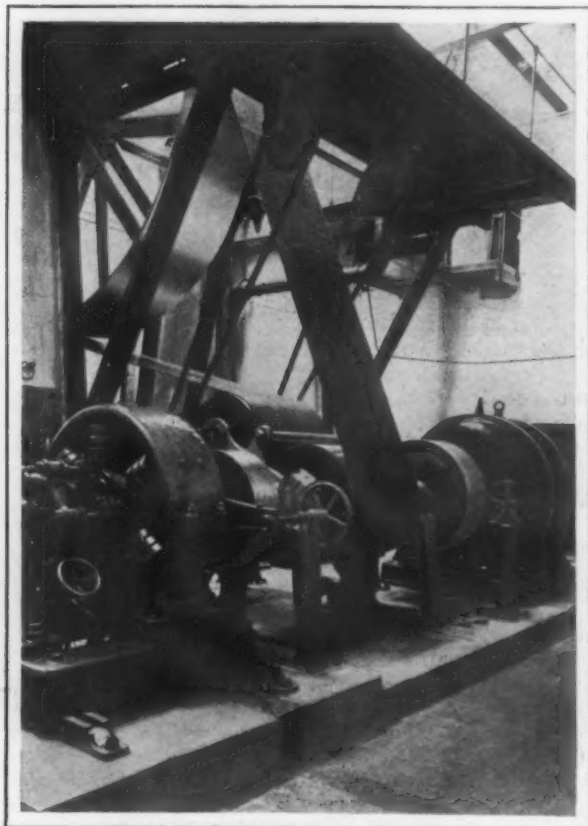
Elevation Showing the Cramped Quarters of the Belt Transmission

pulley about 230 deg. With a speed of the driving shaft of 600 r.p.m. and a desired speed of the driven shaft of 120 r.p.m. the diameters indicated were chosen.

Unnecessary Fatigue of the Worker.—A permanent museum for the collection and exhibition of devices for the elimination of unnecessary fatigue of the worker is an object to which Frank B. Gilbreth, Providence, R. I., is giving quite a little of his time. Mr. Gilbreth, who has in late years given most of his attention to the introduction of systems of industrial management and has been conspicuous in motion studies, is quite emphatic in his belief that the horrors of over-fatigue in factories are more terrible than the horrors of accident and death, and the present movement is intended to develop into a permanent exhibit in the interests of the comfort of the working people. He is having the cooperation of professors and other members of instructing staffs of colleges and other institutions of learning who made up a summer school which Mr. Gilbreth conducted in Providence in August. An array of chairs and footrests already in use for the comfort of those who must remain at their work 8 or 10 hr. a day has been collected.

The imports of iron and steel into France in the first six months of 1913 and the corresponding half of 1912 amounted to 71,605 and 88,305 tons respectively, a decrease of 16,700 tons. Exports showed an increase, being 236,453 tons for the first six months, compared with 167,618 tons for the same period in 1912. The most noticeable features are the increase in exports of 63,734 tons of blooms and ingots and 24,841 tons of rails. The imports of iron ore were 724,576 tons this year to June 30, as against 747,700 tons in the first six months of 1912, while the exports totaled 4,337,607 tons, as against 3,552,290 tons.

Total exports of merchandise from the United States in August were valued at \$187,812,636, compared with \$167,844,871 in August, 1912, and imports were \$137,704,195, compared with \$154,756,770 in August, 1912. The excess of exports was \$50,108,441, against an excess of only \$13,088,101 in August, 1912.



The Lenix Drive in an Interesting Application

A 4-In. Heavy Pattern Forging Machine

A recent addition to the line of bolt, nut and forging machinery, built by the National Machinery Company, Tiffin, Ohio, is a 4-in. forging machine. It is designed to

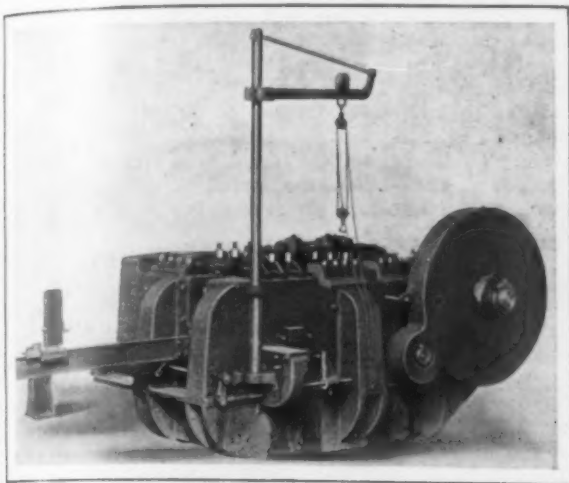


Fig. 1—Front View of a New 4-In. Heavy Pattern Forging Machine

operate on high carbon and alloy steels as well as wrought iron, and it has safety reliefs on both the gripping and plunger movements. Figs. 1 and 2 are front and top views, respectively, of the machine, while Fig. 3 shows some of the squeezing work which has been accomplished between the grip dies.

It will be noticed from Fig. 1 that the frame of the machine extends considerably below the floor line, and that this portion of the bed is of girder construction and of massive section. A heavy pattern steel casting is used for the bed frame, the object being to prevent as far as possible any spring in the bed, and also to do away with the use of longitudinal tierods or tierods at the gap or entrance to the dies. This machine is supplied with motor drive, the motor being geared directly to the flywheel, which is of the builder's friction slip design. While this flywheel, the construction of which was described in *The Iron Age*, November 3, 1910, is primarily intended as a

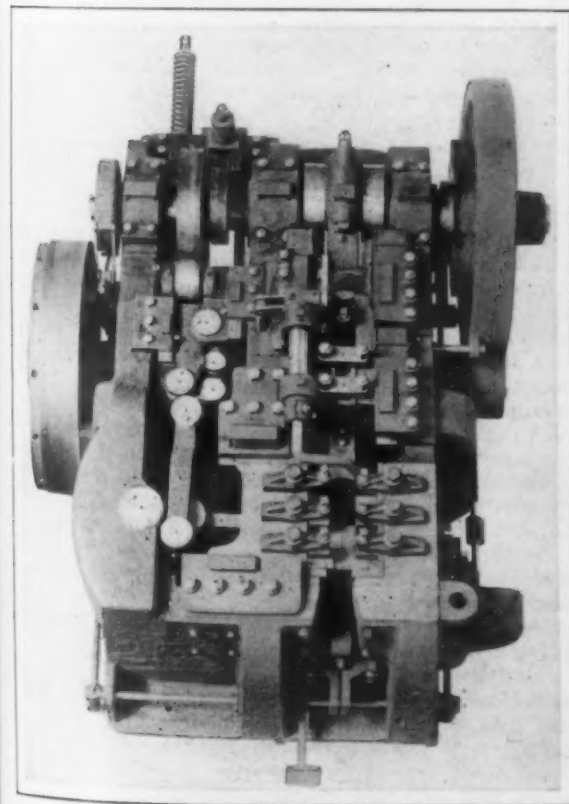


Fig. 2—Top View of the Machine

safety or relief on the heading or plunger movement of the machine, it also provides an element of elasticity, which it is emphasized is found essential between the motor and a machine of this type, due to the varying stresses imposed upon the motor by the gripping and heading movements, and also when the machine becomes accidentally stalled by cold stock or excessive metal. The motor uses a rawhide pinion in the drive to insure quiet operation.

The top view of the machine, Fig. 2, shows the machine at the instant the grip dies have closed and the heading tool or plunger is starting the gathering or upsetting stroke. The heading movement is effected by a crank, while the gripping action is controlled by two cams, one of which controls the forward or gripping movement of the toggles, while the other serves to open the dies. By employing two cams for the gripping movement, it is aimed to time the opening and closing of the dies to secure practically the entire stroke of the heading tool or plunger, thus enabling the machine to upset a large amount of stock at one stroke. This double cam mechanism also makes it possible to open the dies wide, thus facilitating the handling of the upsets in and out of the machine, while in conjunction with the large upsetting capacity, it is possible to handle large and difficult forgings with fewer operations.

The automatic relief on the gripping movement, which is also brought out in this view, is designed in the form of a by-pass toggle. The design of the relief is such that

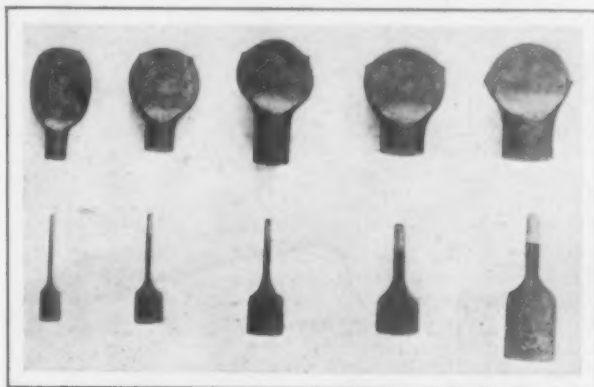


Fig. 3—View Showing Some of the Squeezing Work Accomplished Between the Grip Dies of the 4-in. Machine

only a small proportion of the gripping pressure or power is dependent upon the toggle and the spring which holds it in its normal position. The powerful gripping action in the dies which is provided by this arrangement is illustrated in Fig. 3. The bars shown range from 2 to $3\frac{1}{2}$ in. in diameter and were flattened or squeezed between the flat surfaces of the grip dies in one operation. After the relief mechanism has operated, it automatically resets without shutting down the machine or requiring any attention on the part of the operator.

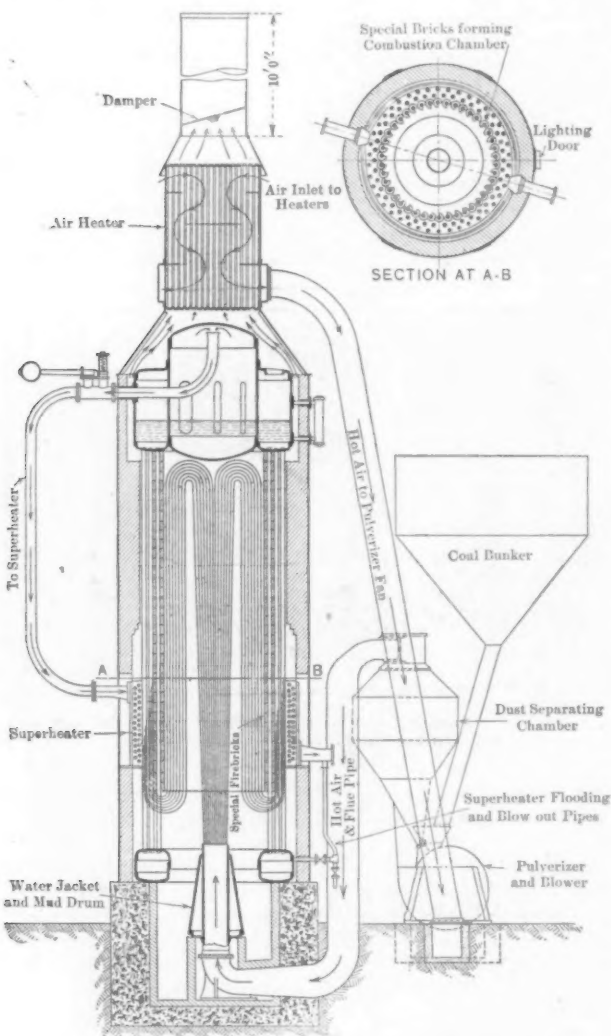
The use of the suspended type of heading and gripping slides is another feature upon which emphasis is laid. In this type of slide the supporting bearings are at the top of the slide instead of at the bottom, this arrangement removing the bearings from the line of water and scale. In the design of these slides, there is a wedge construction back of the side liners to enable shimming to be added as needed, without removing the slides or liners. In this way it is possible to maintain a snug contact between the slide and liner.

The J. D. Smith Foundry Supply Company, Cleveland, Ohio, has received an order from the Pratt & Letchworth Company, Buffalo, N. Y., for a large battery of core ovens to be installed on three foundry floors. It will also install additional core-oven equipment in the Sharon plant of the American Steel Foundries and has taken an order for similar equipment for the Ajax Iron Company, Corry, Pa. It also has the contract for an addition to the plant of the Medina Foundry Company, Medina, Ohio, and will furnish sand-blast equipment and a trolley system for this foundry. The extensions include a pattern storage building, 40 x 120 ft., and an addition to the cleaning room, 60 x 80 ft.

A Water-tube Boiler for Pulverized Coal

A Promising Development in Using Atomized Fuel for Steam Generation

For the use of carburetted air as produced with pulverized coal, atomized oil, common gas and other atomized combustible substances, Fraser & Chalmers, Ltd., London, England, have developed a boiler which is known as the Bettington water-tube boiler. The boiler and solid fuel carbureter have been designed as the result of a long series of experiments. As will be noticed from the accompanying engraving, the design, which employs ordinary metal work and firebrick, involves the use of a vertical gas jet inlet, constructed so that a mushroom-shaped flame is pro-



Sectional Elevation and Cross-Section of the Standard Bettington Water-tube Boiler for Pulverized Fuel Showing the Path of the Gases

duced within a closed ring of vertical water tubes that form a part of the steam-producing plant.

The heating up and continuous ignition of the incoming stream of fuel dust and air is effected primarily by the enveloping sheath of the products of combustion. This self-igniter cannot change its pre-determined position, it is pointed out, no matter how great a velocity is given to the incoming stream of the combustible mixture, and the ignition is independent of the incandescent brickwork. There is, however, a slight tendency for the enveloping gases to increase slightly in temperature as the velocity is increased, and at the same time, these returning gases, it is pointed out, always insure incandescent brickwork around the tuyere. The advantage of this arrangement is that the heat stored is relied on to re-start the fire after a temporary stop. The mixture of dust and air, which, it is pointed out, should be as thorough as possible, is made before it is projected into the furnace.

When one of the coarser particles enters the high temperature zone, it becomes the center of a sphere of

chemical reaction, being attacked by the surrounding oxygen. This soon becomes satisfied with carbon, and if it were not for the fact that the coarse particle is traveling at a greater rate than the lighter air, combustion would cease. The particle rises through its momentum and is accompanied by the upward central current of gases until it is overcome by the action of gravity or strikes the water-top of the furnace, when its direction changes. The downward movement of the particle is accelerated by gravity, so that there is always a tendency for it to change its relative position in the supply of oxygen, without, it is pointed out, causing a concentration of the coarse particles. To secure the best results, it is recommended that the size of the particles be limited to that which can be completely oxidized in the time required for the up and down journey.

The ash of the fuel, in its passage through the zone of highest temperature, is converted into a liquid spray. A portion of this ash strikes the brick lining of the furnace and trickles down to the bottom edge, being kept in a molten state by the descending hot gases until it reaches the lower or dripping edge of the furnace proper. Here it falls to the ash pit, which being relatively cool, chills it sufficiently to prevent the succeeding drop from adhering to it. In this way, it is pointed out, the furnace automatically keeps itself free of slag at all rates of combustion and deposits it in small globules of $\frac{1}{4}$ to $\frac{1}{2}$ in. in diameter, which can be discharged through an ash conveyor or raked out once a day. The use of this liquid spray, it is emphasized, makes it possible to dispense with fireclay in the lining of the furnace, the special firebricks employed being merely stacked in position. When the boiler is fired for the first time, the gases take advantage of all crevices to secure the shortest route to the stack, and liquid ash is sucked through with the gases. As the slag solidifies at a relatively high temperature, however, it is relied upon to choke up and hermetically seal all the crevices and the large holes, thus cementing the lining into one solid piece, as well as glazing the inner surface.

Referring to the diagram of the furnace, it will be noticed that the combustible mixture enters the furnace vertically along its central axis, ignites soon afterward and continues on its upward path until it automatically mushrooms over by coming in contact with the relatively cooler brickwork and the tubes forming the containing walls of the furnace. At this time combustion has virtually ceased, except for the coarser particles, the burnt out gases forming an enveloping sheath and indestructible gas lining between the zone of intense heat and the furnace wall.

Where possible, it is recommended that the coal be fed automatically into a hopper placed on the side of the pulverizer and fed through a worm to a chute leading directly into the pulverizer. The pulverizer also acts as a blower, and after the coal has been disintegrated it is delivered into the dust-separating chamber, where the fine particles pass directly to the fuel nozzle, while the coarser ones return by gravity to the pulverizer for further reduction. After the gases leave the boiler or feed section, they pass through an air heater, thus pre-heating the air before it is drawn in by the pulverizing fan. Emphasis is laid upon the fact that by pre-heating the air in this way it is possible to disintegrate and burn coal containing 15 per cent. of moisture, or even more. In the boiler shown the heater is located in the stack, but in the larger sizes a separate heater, which, if found desirable, can be substituted in the smaller sizes, is used. The amount of air is regulated by slides in the pulverizing fan, and the coal feed is operated by a variable-speed friction wheel, driven from the shaft and controlled by an adjustable slide in the hopper. The usual method of driving the pulverizing fan is by direct connection to a small flexible coupling and motor, although steam engines and small turbines have been substituted in a number of cases. A belt-driven pulverizing fan can also be supplied if the local conditions should render this a better arrangement.

In starting the boiler when cold, a lighted torch is placed above the fuel nozzle, the pulverizer started and the fuel feed turned on. The fuel mixture will then ignite, and the torch can be extinguished and the coal feed set at the desired rate. After temporary stops, all that is required is to start the pulverizing fan and turn on the fuel feed, the ignition taking place from the heat of the brickwork.

The boiler consists of mild steel top and bottom headers, with solid drawn steel tubes connecting them. The header is fitted with doors for drawing the tubes, and a steel expansion pipe for connection to the superheater or the steam main. Special firebricks in combination with the innermost circle of tubes form the wall of the combustion chamber, water tubes preserving the bricks from melting by conduction and evaporation. The tuyere or fuel pipe is usually surrounded by a water jacket, thus forming at the same time a mud drum. The greatest amount of evaporation takes place in the inner row of tubes, and the circulation is very rapid. Any loose scale is ejected by the rapid circulation and settles into the bottom header, from which it can be blown out as often as is necessary. The use of vertical tubes, it is pointed out, prevents the accumulation of soot or dust and a corresponding loss of efficiency. The connecting of each tube directly to the steam header provides a large surface for the liberation of steam, and as the headers are large enough to admit a man, each tube can be inspected throughout its entire length by the removal of one manhole cover in each header.

One of the special features of these boilers is the very small stack that is used. In the larger sizes the stack is placed alongside the boiler, with the air heater immediately below, and a tubular feed section added. Two pressed steel headers with the necessary connections and sheet steel cover comprise the feed section. The gases pass from the boiler into the feed section, and from there through the air heater, and finally to the stack. In the case of the largest boiler two combined pulverizing fans are used, but only one is employed in each of the other sizes, unless reserve equipment is required.

In a series of tests made on one of the boilers at the Johannesburg municipal power station by S. B. Bilbrough, boiler efficiencies of 80.6 and 82.6 per cent. were secured. In the tests the steam pressure was 189 lb. absolute and the temperature of the steam was 515 and 517 deg. F., respectively. The feed water temperature was 77.5 deg. F. and the average percentage of carbon dioxide in the flue gases was 17 per cent. The amount of water evaporated from and at 212 deg. F. per pound of coal was 9.27 and 9.50 lb. The coal used had a calorific value of about 11,160 B.t.u. per lb. and contained 22.80 per cent. of volatile matter, 57.55 per cent. of fixed carbon, 17.50 per cent. of ash and 2.15 per cent. of moisture.

What a New Boiler Plant Saved

In the course of an address made by President J. M. Searle before the International Association for the Prevention of Smoke, held recently in Pittsburgh, a striking array of figures was presented on the results following the abandonment of an outworn steam boiler plant and the well-considered installation of modern steam-generating equipment. Incidentally the address of Mr. Searle, who is chief of the division of smoke inspection of Pittsburgh, was a comprehensive review of the possibilities of smoke abatement and paid quite a little attention to the successful application of the mechanical stoker to the locomotive. The portion of the paper mentioned is as follows:

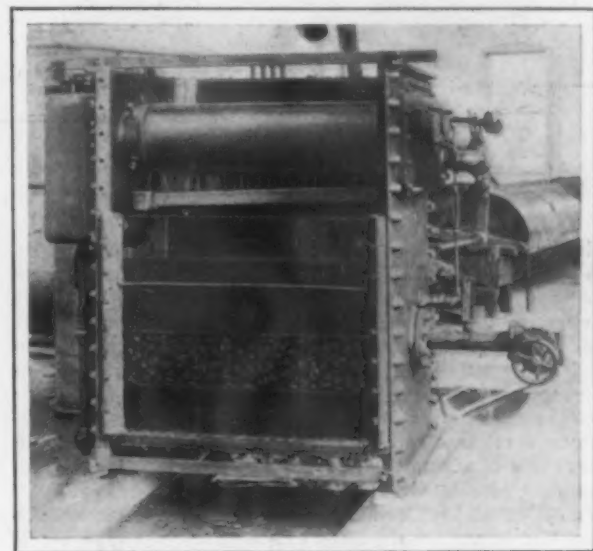
An old plant of 55 boilers had become worn out. The insurance company had cut the pressure to 85 lb.; the mill was loaded down with orders. It was concluded, as a last resort, to find a place to locate an up-to-date plant of boilers and double the steam pressure. Eight 600-hp. units of the water-tube type fitted with good mechanical stokers were installed. These eight new boilers are saving in pay roll \$1,500 per month, and in coal \$3,500 per month, which, as you will note, is \$60,000 per annum, or 6 per cent. on \$1,000,000. But they have done much more than this; they have increased the capacity of the entire mill, which increase is an additional source of revenue, and they occupy but 4500 sq. ft. of ground, whereas the 55 boilers which were thrown out occupied 45,000 sq. ft., which turns loose 40,500 sq. ft. of most valuable ground for purposes of mill enlargement.

It so happened that an evaporative test was being conducted upon one of these 600-hp. units the day the writer last visited this plant, and an average capacity of 948 hp. had been developed for about 6 hr. The eight individual

stacks were absolutely smokeless and the products of combustion had averaged for this 6-hr. period 12½ per cent. of carbon dioxide gas, and yet it is frequently heard among men who call themselves steam engineers that we cannot rush a boiler and maintain a smokeless stack. This plant, that is saving the interest at 6 per cent. on \$1,000,000, cost complete \$130,000, including steel boiler house, main steam piping, feed pumps, Cochrane feed-water heaters, ash and coal handling devices, the latter being for both river and rail. Can better reasons or stronger arguments be produced for the erection of modern boiler plants than is shown by the books of the company from which I have just quoted, and which refer to 8 months' operation of its new boiler plant in this city.

Water Flow in a Feed-Water Heater

To study the actual flow of water in a National direct-contact heater, a demonstration was made in the shops of the maker, the National Pipe Bending Company, New Haven, Conn. One side of the heater was made of glass, a rectangular heater being chosen rather than one of the



Feed Water Heater as Arranged for Demonstrating Flow of Water

cylindrical type. As will be seen from the accompanying illustration, one side of the heater was removed by taking out the corner bolts. A glass plate was substituted for this side of the heater and was sufficiently large to come well above the water line, thus inclosing the lower part of the heater in which the water is retained.

The photograph shown was taken while the water was flowing through the heater at the rate of 850 hp. per hour, the heater having a capacity of 1000 hp. The water entering the smaller pipe of the double-pipe casting overflows at the top through a long port and follows the cylindrical surface of the outside of the pipe in the form of a thin film, which, being transparent, shows in the photograph merely as the pipe. At the bottom of the pipe casting there are two ribs or lips projecting from the port opening which tend to break up the film of water into fine streams as shown. In power-plant operation, the steam within the larger pipe of the double-pipe casting leaves the casting through a port at the bottom and passes through these fine streams of water.

The water is heated by the steam by surface contact while within the pipe above referred to, and is still further heated by actual mingling when it forms the curtain through which the steam passes. The hot water drops to a tray or trough beneath the pipe casting and is conducted to the bottom of the heater from which it flows upward through the filtering material to the reservoir just above. From this point it is taken from the heater to be supplied to the boiler. The accompanying picture shows the water escaping from a valve on the end of the pipe leading from the heater.

A Rotary Hydro-Pneumatic Compressor

Single-Stage Machine and Vacuum Pump for Moderate Pressures

The Nash Engineering Company, South Norwalk, Conn., has brought out an improved type of single-stage hydro-pneumatic rotary air compressor and vacuum pump for pressures not exceeding 15 lb. per sq. in. and vacuums not exceeding 20 in. of mercury. The machines are designed to be practically indestructible and there are no valves or other moving parts excepting the rotor, which is fitted in the casing with a clearance of approximately 1/16 in. in the larger sizes. The pressures on the shaft and bearings, due to the air compression, are balanced and leakage is

carried out by the air and to absorb the heat produced by the compression of the air, the quantity of water used being no greater than that required for the water jacket of a reciprocating compressor. As the amount of water required for this purpose is so small, it is recommended that it be taken from a supply main, so as to always have it cool, but this is not essential, and water discharged from the pump may be caught in a tank or barrel and used over and over. A separator furnished with the compressor frees the air entirely of the entrained water. The equipment of the separator includes a ball float valve similar to that used in a steam trap, which automatically permits the water to escape without loss of air. Ordinarily the vacuum pumps do not require a separator.

The following table gives the speeds and capacities of

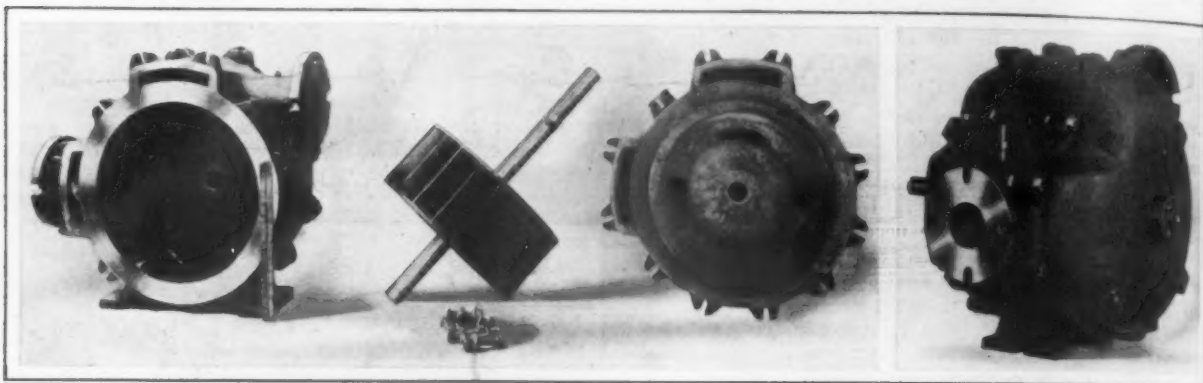


Fig. 1—The Three Parts of the Nash Air Compressor and Vacuum Pump

eliminated, the joints being sealed by water. All the air is expelled from the rotor spaces by the water, and consequently the air clearance is zero. Several blades are delivering air at one time. As one blade is reaching the end of the stroke, another is beginning. The three essential parts are shown in Fig. 1, and Fig. 2 is an exterior view of the machine. Details are given in Fig. 3.

The pump operates on a new principle. A liquid, usually water, is made to revolve by the rotor in an elliptical casing, the rotor consisting of a wheel casting with integral projecting blades. Centrifugal force causes the liquid to follow the casing, and it alternately recedes from and surges back into the rotor. On the sides of the pump casing, at points where the water is leaving the rotor, are air ports connected to an inlet pipe. At points where the water is re-entering the rotor are air ports connected with the outlet pipe. As the water recedes from the rotor, air is drawn in through the inlet ports to fill the void. As the rotor advances, the air contained between the sides of the pump casing and the rotor is compressed by the re-entering water and forced out of the outlet ports. As the blades of the rotor pass by the end of the outlet ports, all the air has been expelled, and the spaces between the blades of the rotor are full of water and ready to repeat the operation.

The water in the pump stays at the level of the outlet ports and is used continuously, any additional water coming into the pump being immediately thrown out with the air in the form of a spray. A small quantity of water is added to the pump during operation to make up the water

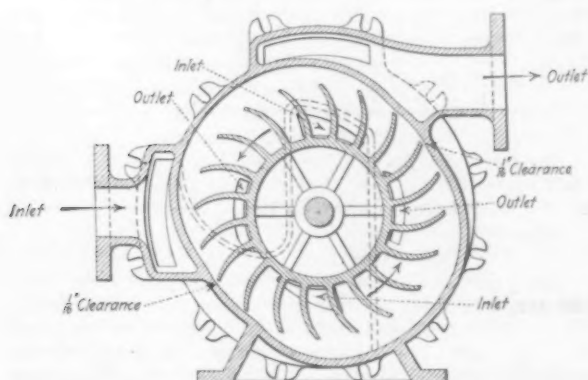


Fig. 3—Details of the Design of the Nash Rotary Air Compressor and Vacuum Pump

Fig. 2—An Exterior View

the standard, single-stage air compressors and vacuum pumps:

Size	Air Compressors		Vacuum Pumps	
	Speed, r.p.m.	Capacity, cu. ft. per min.	Speed, r.p.m.	Capacity, cu. ft. per min.
1/2 0	1,400	30	1,150	30
0	1,400	50	1,150	50
1	1,000	110	850	100
2	725	220	650	200
3	575	330	650	300
4	500	500	430	450

In addition to these six sizes, larger sizes and multi-stage compressors and multi-stage pumps for higher pressures and vacuums can be built to order.

Three Years' Work of the Pennsylvania Anthracite Conciliation Board

The report of the board of conciliation of the Pennsylvania anthracite coal trade for the three years from April 1, 1909, to March 31, 1912, just published, shows that 27 formal grievances have been considered during that period. It has been the consistent policy of the board to use all its influence to have difficulties settled without resort to formal argument, and of the 27 grievances which have come before it during the last three years 16 were withdrawn for one reason or another, generally an agreement of the parties after a clear discussion before the board. In one case a just and equitable price was fixed by the board for certain work. In four cases there was a tie vote, and no further action has yet been taken. One grievance was referred to an umpire. Two grievances were adjusted by mutual concessions, and in one the mine worker complainant was sustained. In one case the board found that it had no jurisdiction, and one has been allowed to rest by agreement of both sides.

The board consists of three representatives of the mine workers and three representatives of the operators. The members discuss the cases among themselves and, if possible decide them by a majority vote. When they fail to agree an umpire is called in, but this has seldom been necessary.

Exactly 200 formal grievances have been presented to the board of conciliation since it was created by the Roosevelt strike commission in the spring of 1903. Of these, 150 were presented in the first three years of its existence, 23 in the second three years, and 27 during the last three years. The decrease is due to the fact that the

action of the board on the earlier grievances established just rules and precedents which prevent the presentation of similar grievances.

It was feared that the appointment of local grievance committees at the collieries, so eagerly urged by the representatives of the mine workers at the conference last year, would impair the usefulness of the conciliation board, but it has achieved such a reputation for fairness and impartiality that it has been as busy as ever.

Improvements in Milling Machine Design

The Oesterlein Machine Company, Cincinnati, Ohio, has taken a step along the line of the unit system of construction now generally employed in machine tools in its new design of cone pulley type milling machines. These tools, which are designated as the Ohio model, are built in both the plain and universal types, with an identical table and table mechanism and knee and knee mechanism, the only difference between the two machines being the employment or omission of the swiveling saddle. Another special feature of these machines is the use of a rather unique belt-shifting device. Fig. 1 is a view of the universal machine, while the upper and lower portions of the belt-shifting mechanism are shown in Fig. 2.

The belt-shifting device, which is illustrated in Fig. 2, will, it is pointed out, permit an unskilled operator to make the speed changes rapidly, without fear of bodily injury. A complete turn of the handwheel shown in the lower portion of Fig. 2 runs the belt from the center of one cone pulley step to the next consecutive one, while a simple lever carrying a straight-line motion-link, as shown in the upper portion of the same engraving, places the belt in the desired position of the countershaft cone pulley. In this way it is pointed out that the required speed is attained instantly without making any intermediate changes. As will be noticed from both engravings, the diameter of the smaller step of the cone pulley is almost as large as that of the largest one, thus approaching constant horsepower for any given speed of the countershaft. The back gear is eccentrically mounted on the shaft below the spindle in the columns, and emphasis is laid upon the fact that the gears run silently under all conditions.

The spindle is supplied with continuous lubrication from oil wells cast into column. Positive drive of the arbor is secured by a recess across the spindle-nose, as shown in both Fig. 1 and the lower portion of Fig. 2. As this is

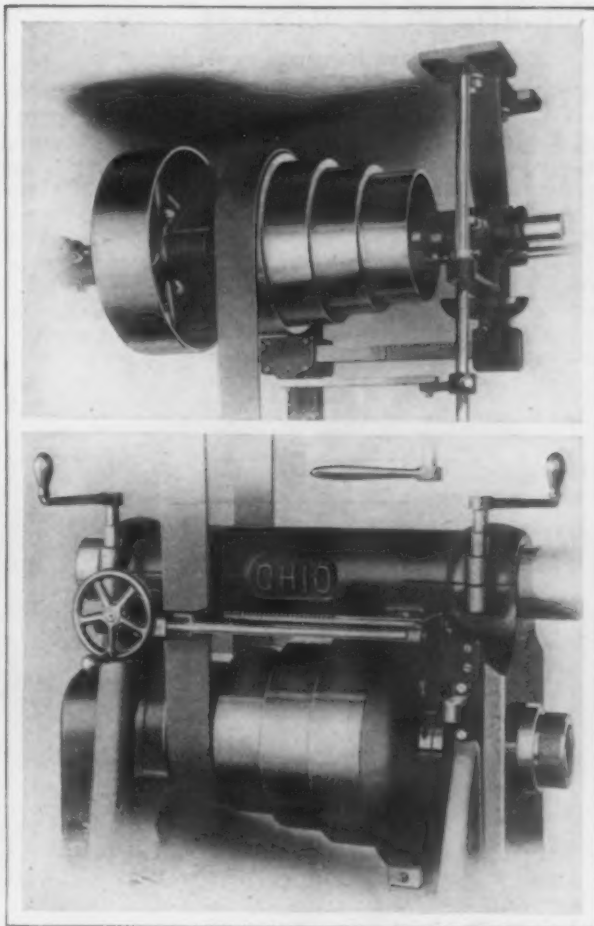


Fig. 2—The New Type of Belt Shifting Mechanism Employed

alike on a number of sizes, all the cutters and tools are thus interchangeable. Automatic flooded lubrication secured by having gears revolve and dip in oil is employed for the feed-box mechanism. All the gears and shafts in the gear box are hardened and ground and run in bronze bushings.

Ten different machines are built, five sizes of plain and five sizes of universal.

A Device for Feeding Graphite into Boilers

To give a steady, gradual feed of graphite into the feed water of a boiler, the United States Graphite Company, Saginaw, Mich., has developed a feeding device. This is connected with the boiler feed line at the suction side of the pump, and is furnished equipped with all the necessary valves and fittings.

The feeder has a reservoir equipped with valves, so that it may be entirely closed and all water pressure shut off. The water valve is then opened, so that the ordinary city water pressure is applied to the reservoir of the feeder, and this combination of water and graphite is fed through an outlet valve at the bottom of the reservoir into the feed water on the suction side of the pump. The valve controlling the passage of the graphite-saturated water can be adjusted by watching the water glass to see how fast it is traveling, thus enabling graphite to be fed constantly to the boiler with the feed water until the contents of the reservoir is exhausted. When this happens the valves are closed and the reservoir is emptied of the clear water through the drain valve, after which it is again filled with graphite and the operation repeated.

The owners of the Clay Machine Company, 6950 Kinsman road, Cleveland, Ohio, have incorporated their business under the name of the Clay Engine Company and will build heavy duty gasoline and kerosene engines for marine purposes. The new officers are: E. H. Clay, president; H. S. Smith, vice-president; P. R. Ward, secretary-treasurer.

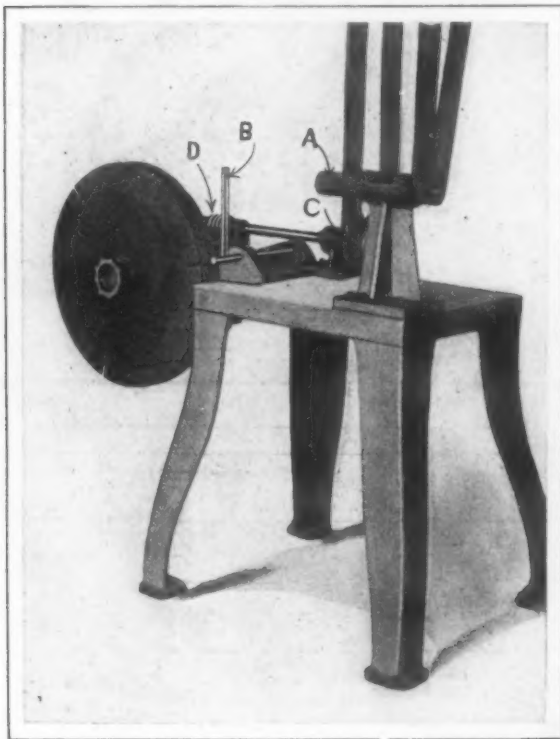


Fig. 1—View of the Improved Oesterlein Universal Milling Machine

Machine for Straightening Music Wire

Prepares and Bundles Material for Use in
Spring and Wire Forming Machinery

Music or piano wire, which is fed from the coil to automatic spring making and wire forming machines, is usually supplied in commercial rolls of relatively small



The Sleeper & Hartley Company's New Music Wire Straightening and Bundling Machine

diameter, and the different lead of the wire as it passes from the coil is found to produce variations in the product. Practice has demonstrated that the usual roll straightener will not serve the requirements under such conditions. The Sleeper & Hartley Company, 98 Beacon street, Worcester, Mass., has, therefore, designed a straightening and bundling machine for preparing wire of this description.

The straightening flyer A, which is mounted in a bearing stand on the table, may be rotated at any desired speed up to a maximum of 5000 r.p.m. The wire passes through the straightener onto the take-up reel, being fed uniformly through the moving guide B. The reel is of sectional construction with removable sides, and there are slots to permit the coil to be tied before removal. The machine is driven from an overhead shaft by a belt running over the pulley C, the power being transmitted through the worm gearing D. The flyer and the reel are both driven from the same countershaft.

Pumping Station with 1000-hp. Diesel Engines

What is claimed to be the most powerful installation of the Diesel engines yet completed is to be found in the pumping station at the Gladstone Dock, Liverpool, England. An account of this installation appeared in a recent issue of *Engineering*. There are five units in all, each composed of a 54-in. Worthington centrifugal pump directly connected to a 1000-b.h.p. Carels-Diesel engine. Each pump has discharge branches 54 in. in diameter with two suction branches, each 40 in. in diameter. The capacity of each pump is not less than 58,000 gal. per min. and the pumps are designed to work against a maximum static head of 48 ft. when running at a speed of 180 r.p.m. When the pumps are to be used for drainage purposes they can pump against a maximum head of 61 ft.

The engines are of the vertical two-cycle four-cylinder Diesel type, and each is capable of developing its normal output at a speed of 180 r.p.m. and to carry a 10 per cent. overload for 2 hr. They mark a distinct departure in the

design of this type of internal combustion engine, as they are fitted with marine type cross-heads, running in water-cooled guides that take the thrust which formerly came on the side of the engine cylinders. Two fuel pumps, having a plunger for each cylinder, deliver the fuel directly to each fuel valve. Air for fuel injection and starting purposes is delivered by water-cooled quadruplex high-pressure air pumps which discharge into injection vessels, one for each engine. The overflow from these vessels is used to keep the two starting reservoirs fully charged. These are interconnected with each other, and with an auxiliary motor-driven compressor so that the contingency of any engine's not being able to start through loss of air has been amply guarded against. The exhaust leaves the engines through ports in the side of the cylinders and passes through water-cooled downtake pipes to an underground collector pipe and thence to silencers.

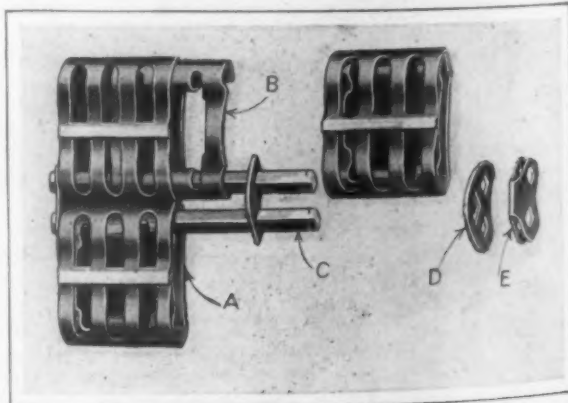
Under each engine cylinder is a ring for collecting the cylinder lubricating oil and to prevent it from mixing with lubricant in the crank pit. A separate pump is employed to remove the oil from the collecting ring and the oil consumption can thus be economically adjusted. A speed regulating gear giving a variation of 180 to 198 r.p.m. is provided to compensate for the different heads against which the pumps have to operate.

Steel Belting of Unit Construction

A flexible steel belting, designed as a substitute for double leather belting, is described by its manufacturer, the Flexible Steel Belting Company, Bridgeport, Conn., as the patent knife-edge multiple unit system. The units of which the belting is composed and which are shown in the accompanying illustration are 1 in. in width and belts can be made to any desired width. There are 10 units to the foot in the standard belting. They are joined by a diamond bar of high-carbon case-hardened steel. Each unit consists of a bow link, hardened steel bearing, drag link and soft steel cotter for locking the ends of the bars, all made of sheet steel, and the diamond-shaped bar. The bar or pin in contact with the hardened sheet steel bearing forms a knife-edge joint between the units.

While the belt will run at low speeds and in any place where a strong, durable belt is required, and where double leather belting usually is used, it is especially recommended in locations where it would be subjected to extreme heat, grit, oils, etc. According to the maker, it is not affected as regards wear by moisture and can be run through water. The standard belt is finished in carbonia finish to make it rust resisting. Where the belt is used on a steel or iron pulley it is necessary to cover the pulley with split leather or single leather belting. This expense, which is not a large one, is more than offset, the maker asserts, by the fact that the belting does not stretch and repeated take-ups are unnecessary.

A report of tests made at the Massachusetts Institute of Technology indicates that the belt used in the trials had great transmission power in relation to width, that the percentage of slip was low, that it had sufficient elasticity to withstand sudden strains, that it ran smoothly when slack, that it was quiet and at high speeds showed no tendency to heat. It is pointed out that inasmuch as an



A, Bow Link; B, Hardened Steel Bearing; C, Knife-edge Pin; D, Drag Link; E, Soft Steel Cotter for Locking Ends of Pins

entire belt is an assembly of units it can be shortened or lengthened easily and repairs can be made quickly. The belting has been found especially adaptable in connection with railroad coal pockets, laundries, chemical works, candy factories and other manufacturing plants.

A Free Piston Gasoline Rock Drilling Machine

An entirely self-contained drilling unit, consisting only of the drill and the tripod, has been brought out by the Rice Gasoline Rock Drill Company, 1510 Land Title Building, Philadelphia. It has a full floating free piston action and the piston rod, pistons and drilling bit are all connected together to form a direct striking piece, which acts and strikes the rock in the same manner as air and steam drills.

The motive force of this gasoline drill is furnished by two cylinders opposed to each other. A piston rod, fitted with a piston for each cylinder and having a bit chuck on the end, continues through the two cylinders. A make and break spark plug for each cylinder is tripped and fired by each piston alternately. The firing of the rear cylinder drives the piston and the bit forward, all the force of the explosion of the mixture of gasoline and air being utilized in striking the rock. The explosion of the mixture in the front cylinder then forces the piston back to its original position, the bit being lifted out of the hole rapidly. The pulsator is of the two-cycle design, without valves, and is fired at each stroke of the piston. The cylinders are water-cooled, a self-contained pump, which operates simultaneously with the drill, supplying the water. The fuel and oil container is attached to the side of the drill and can be adjusted to the angle at which the drill is set. When running, the lubrication of the working parts is automatic.

The drill strikes 600 blows per min., with a bit 24 ft. long, and will drill a hole from $1\frac{1}{8}$ to $2\frac{3}{4}$ in. in diameter at any angle. The cutting speed is under the control of the operator, but it is claimed that when the drill is running at full speed the cutting is as rapid as the steam or air drills of equal cylinder size and weight.

Van Alen & Co. to Be Reorganized

A change has been made in the old firm of Van Alen & Co., manufacturers of iron and steel nails, owning the Northumberland Iron & Nail Works at Northumberland, Pa. The surviving partners of the firm—namely, C. G. Van Alen, Edmund G. Van Alen, and William B. Waples—and T. O. Van Alen and Helen W. Van Alen, heirs of G. R. Van Alen, deceased, have issued a notice that Frederick Round has been constituted liquidating agent of the firm, which was terminated as of September 23, 1913. Persons having claims against the firm will present them to Mr. Round, who is also authorized to collect all moneys due. The business will be continued by Edmund G. Van Alen, who will have associated with him in the new partnership William B. Waples of the old firm and two other capitalists, but the arrangements have not yet been completed.

The Peckham Mfg. Company, 238 to 246 South street, Newark, N. J., is manufacturing leather polishing meal for use in tumbling barrels. It is made from selected leathers, producing a perfectly smooth leather meal which is equally effective on light or heavy work. For tumbled articles requiring an abrasive action in the barrel, to smooth off tool marks or other imperfections, a combination of the leather meal and emery is made. The company states that the meal can be indefinitely re-used, effecting a great saving in the cost of polishing material.

A New Type of Hand Milling Machine

For machine operations, such as keyseating, hobbing worm gears, profiling, cam cutting, etc., the C. G. Garrigus Machine Company, Bristol, Conn., has placed on the market what is known as the No. 2 Bristol hand milling machine. This machine is equipped with lever, as well as crank feed, which, it is pointed out, makes the machine very convenient of operation. Fig. 1 is a view of the operating side, while the driving side is illustrated in Fig. 2.

The spindle, which is fitted with No. 9 Brown & Sharpe or No. 3 Morse tapers on each end, has a vertical feed of 6 in. Check nuts provide the necessary adjustment of the spindle, from one end. The bearing sleeve for the spindle, which is made of bronze, is long and has double end taper, with a reservoir in the center, which it is emphasized, gives ample lubrication to the taper bearing. The geared head located on the spindle is relied upon to provide

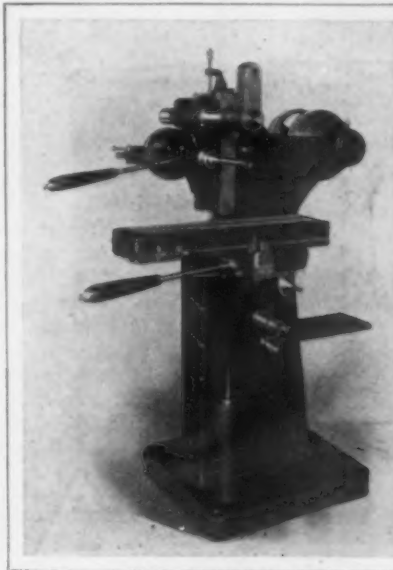


Fig. 1—The Operating Side



Fig. 2—The Driving Side

TWO VIEWS OF THE NEW NO. 2 BRISTOL HAND MILLING MACHINE DESIGNED ESPECIALLY FOR SMALL MACHINING OPERATIONS

sufficient power for heavy cuts and to eliminate belt slip. When these gears are not in use, they all revolve together, as in a planetary transmission construction.

The back shaft is fitted with double row combined radial and thrust bearings, and there is a three-step cone pulley mounted thereon, over which a $1\frac{1}{2}$ -in. belt runs. Six changes of spindle speed are available by the use of this pulley. The overhanging arm can be turned out or removed altogether, as may be desired. The distance from the center of the spindle to the underside of the arm is $3\frac{3}{8}$ in., while that from the end of the spindle to the center in the arm is 12 in.

The table, which has a working surface of 5 x 22 in., has one T-slot, $\frac{5}{8}$ in. in width cut in the top. An oil channel runs entirely around the table. The distance from the top of the table to the spindle center is 17 in., and it is operated by a crank or lever connected to a rack and pinion. The length of the hand lever feed is 6 in., while that of the crank lever feed is three times as great. There is a transverse movement of $6\frac{1}{2}$ in. provided for the table.

The floor space occupied by the machine is 30 x 46 in., and the size of the base of the floor is 21 x 24 in. The weight of the machine, without the countershaft, or the power feed, is 1112 lb.

The United States Cast Iron Pipe & Foundry Company announces that its two plants at Louisville, Ky., are to be closed in the immediate future, October 1 being the date named for the discontinuance of active operations. R. G. James, superintendent of the main Louisville plant, was presented with a diamond ring by the workmen under him. He retires from the service of the company and will go into the business elsewhere. D. Long, resident manager in Louisville, will probably be transferred to another plant.

Combination Folding Machine and Brake

For handling a large variety of work, the Niagara Machine & Tool Works, Northland avenue, Buffalo, N. Y., has recently brought out a combination folding machine and brake. It is designed to turn close edges for lock seams, as is the case with a regular folding machine, and it can also be used in the same manner as an ordinary brake. In addition, it is pointed out that the operator can form work with rounded members in a much better and more convenient manner than with the ordinary machines. Fig.



Fig. 1—A Recently Developed Sheet Metal Folding Machine and Cornice Brake

1 is a view of the machine, while Fig. 2 is a detail of the various folding members.

The forming of rounded members is accomplished by constructing the folding, as well as the lower clamping, bars, so that they can be set up to 2 in. below the folding axis. Bevel gears and screws actuated by a handwheel enable this adjustment to be obtained on the lower clamping bar, both ends being adjusted at the same time. Separate adjustments by screws are provided for the ends of the folding bars. The upper clamping bar can be raised to a maximum of 4 in. above the folding axis to give ample space for inserted mandrels. In folding rounded members the folding and clamping bars are lowered an amount equal to the radius of the desired curve and then locked. The upper clamping bar is raised sufficiently to accommodate the inserted mandrel and the material.

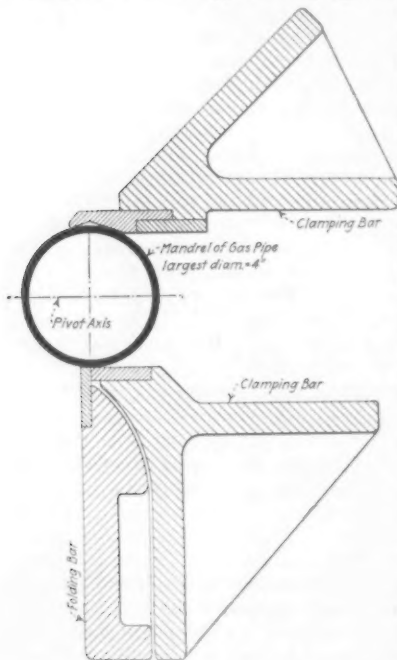


Fig. 2—Detail of the Various Folding Members

tion of the folding bar. The edge of this bar is $\frac{3}{8}$ in. wide, which enables the machine to handle No. 18 gauge and lighter stock, while by substituting a removable angle-

shaped bar, No. 16 gauge material can be handled. Screws are not used in the attachment of the folding blade to the upper clamping bar, the arrangement being such that it can be instantly removed.

If desired, the machine can also be used for forming rounded pipe over mandrels of suitable diameter, which are held in place by bolts at both ends.

An Improved Type of Safety Lathe Dog

The Oneida National Chuck Company, Oneida, N. Y., has added a safety lathe dog to its products to which the trade name of National has been given. It is claimed for this chuck that it is practically impossible for the persons using it to injure themselves or be injured by carelessness in using the dog, as there are no projections, driving arms or set screws to strike the operator's hands or catch his clothing, as the face and rim are entirely smooth.

The dog is made up of hardened steel jaws inclosed in a body, with drivers projecting from the rear of the body, as shown in Fig. 2, to enter slots in the faceplate of the lathe. There is a hardened steel adjusting screw at each end of the body for closing the jaws on the work and two springs for opening the jaws, as is brought out in Fig. 1. The face of the dog is covered by a pressed steel guard, which holds the jaws and spring in place. This gives the dog a circular shape and prevents the adjusting screws from being run out beyond the guard, since the holes over these screws are only large enough to admit the wrench.

There are two $\frac{1}{2}$ -in. holes through the guard, so that it can be bolted to the faceplate of the lathe, thus effecting a saving of time in changing when duplicate parts are being made, as the adjustable jaw permits the dog to be centered and run true with the faceplate and the work.

These dogs can be used for holding round and square stock, as well as the flat stock, as shown in Fig. 2. Six

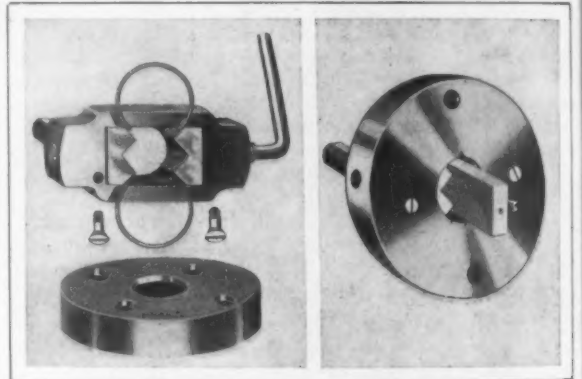


Fig. 1—The Various Parts of the Dog Fig. 2—The Dog Holding Flat Stock

TWO VIEWS OF A NEW AND IMPROVED TYPE OF SAFETY LATHE DOG

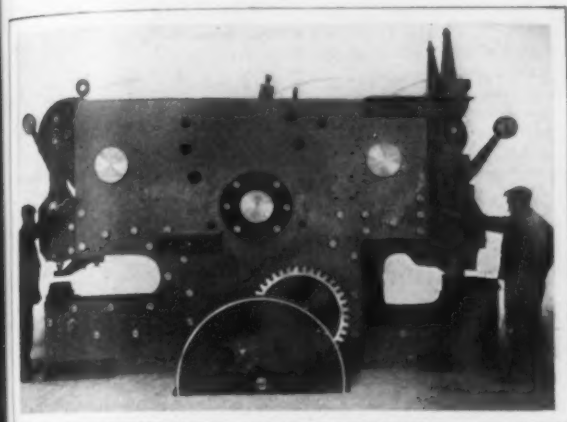
sizes in all of dog are made, and it is pointed out that by the adjustable feature each size takes the place of three or four sizes of the ordinary type.

Large Increase in Forging Capacity.—The Titusville Forge Company, Titusville, Pa., has completed plans to treble the capacity of its plant within the next 18 months. Among new equipment recently installed is a complete chemical and testing laboratory, in which is a 150,000-lb. Riehle testing machine. In the main forge shop a new electric crane, with a capacity to handle forgings up to 80,000 lb., has been installed to serve the furnaces and hydraulic press. Among other new installations are a 300-hp. vertical water-tube boiler, a 42-in. Espen-Lucas motor-driven cold saw, four 42-in. special crankshaft lathes, with motor drive; a 96-in. lathe, with special attachments for accurately finishing large crankshafts; a No. 4 heavy duty Le Blond milling machine; new crane runway, 30 x 330 ft., with a 25-ton crane to serve the new steel storage yards. The company is in the market for two 20-ton overhead traveling cranes.

Large Combined Punching and Shearing Machine

Among the machines included in a shipment recently made by Henry Pels & Co., 90 West street, New York City, to Russia was a large punching and shearing machine. It is designed to punch holes 3 in. in diameter in a 2-in. steel plate of 0.3 carbon and for shearing in the center of a 2½-in. plate, 60 in. wide.

The frame of the machine is of the builder's steel plate construction. It has a Cameron lever, which has proved



A Very Large Combination Punching and Shearing Machine Capable of Punching 3-In. Holes in a 2-In. Plate or Shearing Plates 2½ In. Thick

satisfactory in heavy duty machines of this nature. These levers are forgings and operate with hammered steel eccentrics, which are 20 in. in diameter. Phosphor bronze is used for all of the bearings, which are of large dimensions.

The depth of the punch throat is 42 in., and the cutting blades are 28 in. long. The machine operates at the rate of 28 strokes per min., with a flywheel speed of 300 r.p.m. The length of the stroke is 3 in., and to drive the machine at the required rate 45 hp. is needed. The over-all dimensions of the machine are, length, 21 ft. 2 in.; width, 6 ft. 4 in., and height above the floor, 13 ft. 4 in. The weight of the machine is 109,000 lb.

National Machine Tool Builders' Programme

An interesting programme has been prepared for the twelfth annual convention of the National Machine Tool Builders' Association to be held at the Hotel Astor, New York City, October 22 to 24. The convention will open at 9 a. m. Wednesday, October 22, and the first session will be devoted to registration, roll call, reading of minutes, report of membership committee, announcement of convention committees, offering of resolutions and reports of officers and committees. This session will close with an address on "Cost Accounting Practice, with Special Reference to Machine Hour Rate," by Clinton H. Scovell, Clinton H. Scovell Company, Boston, Mass.

At the Wednesday afternoon session, beginning at 2, addresses will be given as follows: "Selling Guarantees; What are Safe Limitations?" by George O. Gridley, Windsor Machine Company, Windsor, Vt.; "Automatic Features on Machine Tools; To What Extent Are They Commercially Profitable?" by Edson R. Norris, Westinghouse Electric & Mfg. Company, East Pittsburgh, Pa.; "The Development of Cutting Tools," by B. F. Waterman, Brown & Sharpe Mfg. Company, Providence, R. I.

The Thursday morning session, beginning at 10, will be taken up entirely with papers on the subject of heat treatment of steel. Two addresses on "The Use of Heat-Treated Gears in Machine Tools" will be presented. Andrew C. Gleason, Gleason Works, Rochester, N. Y., will discuss this subject from the standpoint of the manufacturer of machine tools, and J. Heber Parker, Carpenter Steel Company, Reading, Pa., will discuss it from the standpoint of the material manufacturer. A paper on "Carbonizing and Heat Treating of Shafting; Methods and Materials to Be Used," will be presented by J. G. Weiss, Hyatt Roller Bearing Company, Newark, N. J.

The Thursday afternoon and Friday morning sessions

will be devoted to sessions of the various committees. A number of interesting reports are expected from these committees. One from the committee on the "Formation of a Mechanical Section" will probably excite considerable discussion. A preliminary report by this committee was made at the semi-annual convention in May. At the closing session on Friday afternoon there will be reports of the convention committees, suggestions by members as to the work of the association and a heart-to-heart talk, the latter being in executive session.

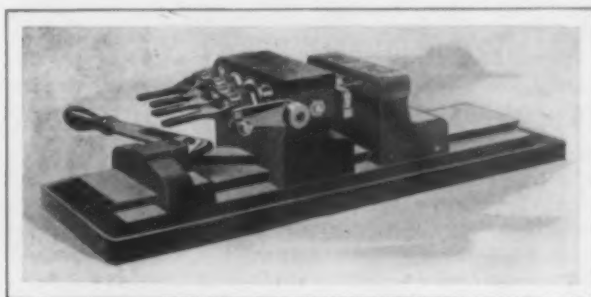
The programme committee has spent a great deal of time in selecting the subjects and speakers, in order, as far as possible, to represent the wishes of the association as a whole, and it is believed that the programme is one of the best that has been arranged for presentation before the association.

A New Application of Milling Centers

A new application of the milling centers made by the Bickford Machine Company, Greenfield, Mass., is for fluting machine screw taps. When this work is being done, the taps are held by spring chucks and the point end supported in a bushing. The regular head center block is used, and the indexing is accomplished by either a complete or a half turn of the crank.

A small bell center inside the spring chuck receives the end thrust and is relied upon to keep the tap from turning in the chuck when the indexing is being done. The spring chucks are tightened by a cam device or eccentric studs which connect the levers with rods running through the spindles of the head block.

In use the chucks are opened by simply raising the levers which stick out at the left, and after the taps are tightened in the chucks, the head block is moved forward by the



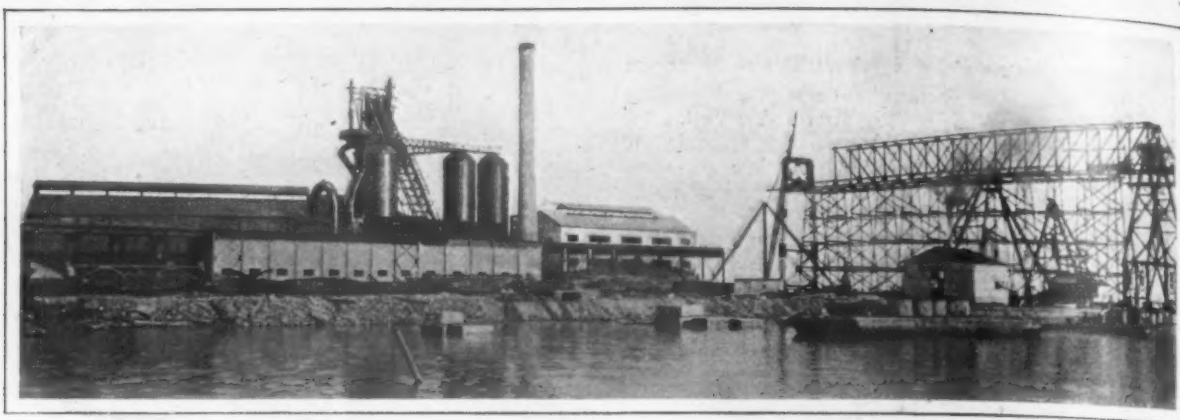
A New Application of Milling Machine Centers in Connection with the Fluting of Machine Screw Taps

lever at the extreme left. In this way, the taps are brought into the bushings, which are grooved to receive the fluting cutters.

A book on "Preservative Coatings for Structural Materials," to be issued by the American Society for Testing Materials, is now on the press. It is a special volume containing the reports of the 10 years' work of the committee of the society having this subject in hand. The volume will comprise about 425 pages. Advance orders at \$2.50 for cloth binding are now being taken by Prof. Edgar Marburg, secretary of the society, University of Pennsylvania, Philadelphia, Pa.

The commissioner of public works of Milwaukee, Wis., has ordered that in the future water meters of bronze shall be used instead of cast-iron meters where the size is from ½ to 2 in. The order is the result of experimentation by the waterworks department. An iron meter in use 16 years was found to be badly rusted and practically useless, while a bronze meter in service 21 years was found to be in good condition and had depreciated only slightly.

To provide larger quarters, the Humphrey Pipe & Foundry Company, Bellefontaine, Ohio, has purchased the plant formerly occupied by the Bellefontaine Foundry & Machine Company.



The New Blast Furnace at Port Colborne, Ont.

Ore from Canada and Lake Superior and
a Canadian Market for the Output—De-
velopment of the Welland Canal District

Unusual circumstance attended the blowing in of the furnace of the Canadian Furnace Company, Ltd., at Port Colborne, Ontario, on Saturday, September 27. The site is at the Lake Erie entrance of the Welland Canal, and as the market for the output of the furnace will be almost entirely in Canada, its starting up had significance on both sides of the international boundary. All of the stock of the Canadian Furnace Company, Ltd., is owned by the Buffalo Union Furnace Company of Buffalo, which for a good many years has operated three furnaces, and the Port Colborne stack virtually becomes furnace No. 4.

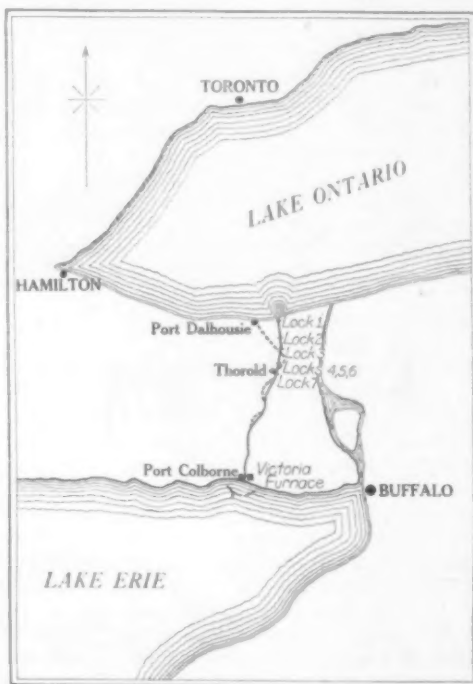
More than 500 guests saw the lighting of the new furnace. Those from Buffalo included a number of foundrymen and other friends of the Buffalo Union Furnace Company, and of M. A. Hanna & Co., Cleveland, who are the sales agents for the product of the four furnaces. The trip from Buffalo was made in a special train and at Port Colborne another special train was met which brought a large delegation of manufacturers and others from Canadian points, including Montreal, Toronto and Ottawa. Canadian foundry interests were well represented in this party. At Port Colborne the steamer Modjeska was boarded, conveying the guests to the furnace site, which is on the east side of the mouth of the canal, the greater portion of it being made land. The blowing in ceremonies were witnessed by a large company, and the torch was applied by Miss Theresa Yates, daughter of Harry Yates, vice-president of the Buffalo Union Furnace Company.

Early in the afternoon the guests again boarded the Modjeska for a trip up the Welland Canal as far as Thorold, which is about 18 miles from Port Colborne. On the way an elaborate luncheon was served, in connection with which there was some speech making, signaling the successful carrying through of an undertaking of considerable importance to the Welland Canal district, and appropriately giving prominence to the great work Canada has undertaken in the construction of the larger Welland canal. Frank B. Baird, the moving spirit in the Port Colborne project, as he has been in the Buf-

falo Union Furnace Company, referred to the co-operation he had had from Canadian officials and from Mr. Yates, who had been an important factor in the financing of the project. He spoke of the importance to Canada of the steps taken for the enlargement of the Welland canal and paid a tribute to William Weller, its chief engineer, one of the guests, whose plans had been laid on a scale that in some features outdid the Panama Canal. For example, the lock gates for the seven $46\frac{1}{2}$ -ft. lifts will weigh not less than 1100 tons each. Justice Herbert P. Bissell, of Buffalo, was introduced as toastmaster and called on a number of the guests, including Frederick Nichols, president of the Canadian General Electric Company; Chief Engineer Weller; Vice-president R. S. Logan, of the Grand Trunk Railroad; E. H. Butler, of Buffalo; Harry Yates and Bishop Charles A. Colton. At Thorold special trains were in waiting which late in the afternoon conveyed the American party to Buffalo and the Canadian party to Hamilton, Toronto, and other points.

The New Furnace

The site of the new furnace at Port Colborne, which will be known as the Victoria, consists of 12 acres, a considerable part of which is made land. Where the furnace now stands there was a 6-ft. depth of water in July, 1912, when work was begun. By the construction of cofferdams the foundations were laid on rock. In addition to the 12 acres, a portion of which is owned and the remainder leased from the Canadian Government, the company has 50 acres which are now under water. Its frontage on the Welland Canal is 2200 ft. Of this 600 ft. is docked and the remainder will be turned into dock frontage as fast as improvements are made. The lease is for a period of 63 years. No town aid was given to the new company, but it was granted a limited assessment for taxation for a period of years, except for school taxes. With 25 ft. of water at its docks the company will unload Lake Superior ore from the largest vessels. It has also a partial supply of ore from its own mine, the Belmont, located at Cordova Mines, Ontario. This point is



Map Indicating Location of the New Furnace, also Course of Present Welland Canal (Broken Line) and of Proposed Canal (Full Line) with Its Seven Locks

about 40 miles north of Trenton, a port on the north shore of Lake Ontario, 100 miles east of Toronto. The ore is a low phosphorus magnetite. Shipments can be made at the rate of about 150 tons a day. Coke is obtained from the Connellsville region, though a by-product plant at the furnace is a possibility of the future. Limestone is shipped from Calcite, Mich., in self-unloading boats. There is no Canadian duty on iron ore or coke, or on coal intended to be manufactured into coke.

The new furnace is $19\frac{1}{2} \times 85$ ft. and is calculated for an output of from 300 to 325 tons a day. The three stoves are of the two-pass type 20×85 ft. The furnace is blown through 12 tuyeres and bronze cooling plates are used in the bosh and lower construction. As shown in the illustration, there is a double skip hoist and the top construction is of the McKee type. The downcomer is 6 ft. in diameter and is equipped with two bleeders. It terminates in a small dust catcher from which piping leads to a large dust catcher, as shown in the illustration. There is a bin system consisting of six ore bins, two limestone bins and a double coke bin, providing capacity for 1800 tons of ore, 500 tons of stone and 600 tons of coke. The bins are bricked in and steam pipes are provided to prevent freezing in severe weather. Two 6-ton McMyler ore bridges of heavy construction will unload and stock the ore. One of these is now nearly completed. Storage capacity is provided for 500,000 tons of ore.

The trestle approach to the bins is 850 ft. long and 30 ft. high. The ore supply now on the ground was brought by rail from Buffalo docks. Ore is conveyed from the bins to the foot of the skip hoist in an electric scale car. For taking ore to the bins from stock piles or direct from the unloaders a 20-ton Brown transfer car is provided.

In the power house are two Allis-Chalmers compound blowing engines of the long crosshead type. The steam cylinders are 46 and 84 in. in diameter, with 5-ft. stroke, and the blowing tube 84 in. Each engine has a capacity of 385 cu. ft. of air per revolution. The power house also contains a Worthington pump and Deane condenser. The intake for water from the lake is about 20 ft. from the power house. Two 300-kw. General Electric turbo-generators supply direct current at 220 volts for the operation of the ore bridge, scale car, transfer car and for lighting. The boiler installation consists of eight Wickes boilers of 350 hp. each. The skip is steam operated as are the cylinders at the furnace top. The hoist house is equipped with an Otis engine and is located on the

skip side of the furnace directly under the hoist incline.

For the most part the Victoria furnace will be run on foundry iron mixtures and the metal will be sand cast. The cast house is equipped with a Brown pig breaker, hydraulically operated, pressure water being supplied by a Wilson-Snyder pump. A 10-ton electric crane traveling the length of the cast house takes the combs of metal to the pig breaker. Later a pig casting machine will be installed so that the company will be in position to supply chill cast basic iron for shipment up the Lakes or into eastern Canada. The distribution of the Port Colborne output in Canadian territory will be through the Cleveland, Detroit and Buffalo offices of M. A. Hanna & Co. The officers of the Buffalo Union Furnace Company are the following: Frank B. Baird, president; Harry Yates,

first vice-president and treasurer; C. A. Collins, second vice-president; Robert F. Schelling, secretary; B. Marron, superintendent of furnaces.

The New Welland Canal

In connection with the blowing in of the furnace at Port Colborne, one purpose of the company in inviting so large a number of guests was to give its friends some idea of the importance of recent industrial development along the Welland Canal. The strategic location at Port Colborne is evident under present conditions, but it will become of greater importance when the new Welland Canal is completed. The latter will be a ship canal capable of taking boats up to 800 ft. in length, whereas at present canal navigation is limited to boats of 360 ft. length. The new canal follows in



View of Furnace, Stoves and Ore Bins

general the same line as the present one from Lake Erie to Allanburg, which is five miles south of Thorold. There are no locks between Port Colborne and Thorold, but between Thorold and Port Dalhousie, on Lake Ontario, there are 25. The new canal, as shown on the accompanying map, will have but seven locks between Thorold and Lake Ontario. This means locks of unusual height, as the drop from Thorold to the level of Lake Ontario is $325\frac{1}{2}$ ft. through the Niagara escarpment. The total length of the proposed canal from lake to lake is 25 miles. The locks are to be 800 ft. in length by 80 ft. wide, with 30 ft. of water over the sills at extreme low stages of the lakes. The canal width at the bottom will be 200 ft. While the excavation for the present will be to a depth of 25 ft. all structures will be sunk to a 30-ft. depth, so that the canal can be deepened in the future to 30 ft. The preliminary appropriation of the Dominion of Canada for the new work was \$2,000,000. It is estimated the construction will cost fully \$50,000,000.

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Alignment of Rates in the New Tariff

It is well recognized that the various rates of duty on iron and steel in the new tariff are not aligned according to the cost of production. In the efforts now being made to forecast its probable effects upon the market, attention should be directed to the fact that the alignment fails also to be in keeping with our ability to compete with foreign makers in the different products. Some concrete evidence of this is to be found in the distribution of our iron and steel exports, which shows no arrangement in proportion to our production of the different commodities. In some lines we export an extremely small percentage of our output, while in other lines the percentage is relatively large, indicating that our competitive ability varies largely with the product.

We are far from giving any sanction to the idea which often finds expression in loose discussion of the tariff, that if there are exports of a commodity from the United States then there is no need of a tariff to prevent imports into the United States in competition with our manufacturers. Geography plays an all important part. Conditions may easily be conceived by which we should export scrap from California and import it in New York, or export ore from Duluth and import it at Philadelphia, or export tin plate from Pittsburgh to Canada and import it at Galveston, even though in all these cases there was a considerable duty upon the imports.

Nevertheless a glance at the alignment of our exports shows clearly that there is no measure of consonance between the country's export ability, in the actual practice, and the various rates in the new tariff. Using the returns for the first seven months of this year as a guide, our iron and steel exports are running approximately as follows per annum, omitting entirely the wrought iron products and such manufactured steel products as bolts and nuts, horseshoes, railroad spikes, etc., the export trade in which is small.

Exports per Annum—Gross Tons

Scrap	100,000
Pig iron	280,000
Billets, blooms, etc.....	130,000
Finished steel products	2,375,000
Total	2,885,000

That exports of a commodity furnish no suggestion that a tariff is unnecessary to forestall large imports is illustrated by the crucial test of scrap; for while there are fairly large exports of scrap, there are also imports. In the first seven months of this year we exported 59,074 gross tons of scrap, but we also imported 34,888 tons. Obviously our exports of pig iron are very small relative to our exports of finished steel, being, as shown above, only one-tenth as great, whereas our production of merchant pig iron is approximately three-eighths as great as our production of finished steel. To maintain the proportion, we should be exporting pig iron at the rate of almost a million tons a year. Yet the new tariff places pig iron on the free list and imposes duties on practically all finished steel products. Again, our exports of billets, blooms, sheet bars, etc., are extremely small, almost negligible, and yet the new tariff makes them free.

The finished steel products which make up the total given in the table include the following, named approximately in the order of the amounts exported: Rails, structural shapes, plates, pipes and fittings, wire and nails, bars, black sheets, galvanized sheets, tin plates.

Far down in the list are found merchant steel bars, whereas they are easily our largest steel product, next to rails, and the new tariff makes the rate particularly low on bars. Many other failures in alignment could readily be pointed out.

Criticism of the new tariff on the ground of this lack of alignment would undoubtedly be resented by its framers, who practically admit that they have ignored the cost of production and the needs of the iron and steel manufacturers as understood by themselves. In any event the iron and steel trade is not now interested in criticizing the tariff; the tariff is an accomplished fact, and interest centers in its results. The value of the exhibit that our exports of iron and steel have shown wide differences in the proportion of exports to total production in the different commodities lies in the indication it gives that the adjustments in the markets forced by the new tariff will be very complicated. The adjustments will be much greater in some commodities than in others.

Contrary to expectations apparently entertained in some quarters, the adjustments in pig iron will be less harsh than in many finished steel products, and this for the reason that we have a relatively strong pig iron industry near the Atlantic and Gulf coasts. Obviously they are "exposed"; but in comparison with steel products they are safer in this that present pig iron prices in seaboard districts are not represented by the inland market plus the freight to the coast, whereas in the case of steel products this is strictly the case. Pig iron does not move from Pittsburgh to New York, Philadelphia, or New Orleans. Finished steel products do, and the present delivered prices are the Pittsburgh prices plus the rail freight to those points.

Upon all occasions when American steel manufacturers have been given an opportunity to present their case before Congressional committees it has been made clear that the rail freights on finished steel products from Pittsburgh, the basing point, to many important consuming markets are much greater than the rates from foreign ports to the same markets, and it is on this particular account that the adjustments will prove especially complicated. That some markets will have to be resigned is freely admitted, but in each commodity the territory will be different. In different descriptions of the same general commodity distinctions will probably have to be drawn. Thus, while American mills claim that their card of extras on steel bars is scientifically arranged in accordance with the relative cost of manufacture of the different sections, the German practice, if it can be called a practice, is altogether different. The German mills do not seem to have an accepted card, each mill having its own extras, which probably vary with the exigencies of the case. The steel bar buyer in the twilight zone may thus have a great deal of studying to do.

Stimulating Thrift of Employees

A large manufacturer of machinery is planning the experiment of establishing at his works a branch of some institution for savings with the purpose of encouraging thrift in his workmen. The idea is to receive the deposits, but never to disburse money. Easy opportunity would be given the men to increase their savings, immediately upon opening their pay envelopes. The branch may be operated by a savings bank or by the local post office in connection with the postal savings system.

The average workman has little opportunity to go to a bank; he is employed during banking hours. He could use the postal savings system later in the day, but at the end of his work the temptation is to rest or seek amusement. Unless promptly deposited in the bank, money is apt to fritter away. A competence for a man who is working by the day can only come with systematic saving; but with many persons it seems a practical impossibility to get ahead of current expenditures, and the evil days of sickness or idleness find no reserve. It is quite likely that if workmen could make the first withdrawal from their week's wages immediately, to add to their savings account, many of them would embrace the opportunity. In case of the establishment of such a branch, it would seem important to time the distribution of wages early enough so that men would have the opportunity to make their deposits before leaving for home. The inclination to put some of it aside will be greater before the amount has been reduced by various expenditures. Probably no difficulty would be found in establishing a joint account for a workman and his wife, according to a common savings bank custom. Either man or wife may deposit, but to withdraw funds requires the signature of both. The proposed system seems well worth trying.

Law of Place Governs Accident Damages

The full bench of the Massachusetts Supreme Court has just handed down a decision of the greatest importance. It defines for the first time in America the liability of an employer under a workman's compensation act in a case where a workman has been injured in another State whence he had been sent in the course of his employment. The court in its findings states with emphasis that the laws of the State where the accident occurs shall prevail, and not the compensation act of his home State. The influence of the decision is believed by attorneys who have specialized in this branch of the law to be of vital interest because of the precedent which it establishes.

What is true in connection with the Massachusetts act applies to every similar statute which has been framed by other States. To analyze by illustration the principle which underlies the decision, if a Massachusetts manufacturer sends a man to set up a machine in New Jersey—where he has no place of business—and the employee is injured in the course of his labor there, the liability and the damages must be determined under New Jersey laws. That State has a compensation act, which applies, however, only where an employer, doing business in the State, has accepted its provisions as against the employers' liability act. Therefore, in the case in question, which is typical as between other States, the action must be under the New Jersey employers' liability act, with its restrictions as to negligence and limit of damages. But, under what is essentially the universal practice under employers' liability, the employee may bring his action in any State where service can be made. The workman in the supposed case could sue in Massachusetts, and the courts of his home State would decide the issue, but the laws of New Jersey would govern, and not those of Massachusetts. If, on the other hand, the Massachusetts employer also operated works in New Jersey, and had accepted workmen's compensation in that State, the damages would be determined according to the provisions of the New Jersey compensation act.

In the case in issue an employee of the B. F. Sturtevant Company, a Massachusetts corporation, in the course of his employment received the injury, upon which the claim arose, in the State of New York. He was principally employed in Massachusetts, but at times incidentally worked in New York and other States. The industrial accident board found that an insurance company had been paid by the employer for insuring all injuries received by its employees in the course of their employment, whether within or without the Commonwealth. The court finds that:

This factor is not of much significance because the obligation of the policy does not refer to anything occurring outside the State, and provides only for the performance of the requirements and payment of the compensation designated in the act. If the act enforces the payment of compensation for injuries received outside the State, the insurer has contracted therefor; otherwise it has not.

The point to be decided is whether the language used in the act indicates a purpose to make its terms applicable to injuries received outside the State. This must be determined by a critical examination of the words of the statute in the light of its humane purpose. There is nothing which expressly states that the act confirms the rights of the parties touching such injuries. This is significant. In the absence of unequivocal language to the contrary, it is not to be presumed that statutes respecting this matter are designed to control conduct or fix the rights of parties beyond the territorial limit of the State.

The decision proceeds to analyze the act in the bearing of its various provisions on this aspect of its workings, and comes to the conclusion that they collectively disclose a purpose to confine the operation of the act to the territory of the Commonwealth. They fall short of manifesting a plain legislative intent to control the relations of parties as to injuries received outside of Massachusetts. It is pointed out that the British and other foreign compensation acts make definite and careful provision respecting accidents outside their territory. "It is a violent assumption under these circumstances that the Legislature intended its similar law to apply to injuries received in a foreign jurisdiction without express words to that effect." Most of the compensation acts of the various States contain no provision respecting injuries received in a foreign jurisdiction, although several exempt persons engaged in interstate commerce where Federal laws shall be construed to furnish exclusive remedies. In summing up the question the Supreme Court says:

Workmen's compensation acts have been discussed generally throughout this country. It is said in the report of the Massachusetts commission on compensation for industrial accidents that in 13 States, besides Massachusetts, laws of this general character have been enacted, while in 11 others commissions have been appointed to investigate the subject and to draft laws. These various acts, although having certain features in common, nevertheless differ widely in many essential aspects. Some are compulsory. Some prohibit contracts for different forms of compensation, and make criminal under severe penalties failure to comply with their terms. Some provide for strict State insurance, while others do not. The amount of compensation afforded and the circumstances under which it is to be awarded differ. The diversity of public policy already manifested between the several States is considerable. To say that such acts are intended to operate on injuries received outside the several States enacting them would give rise to many difficult questions and a conflict of laws. It would require a large dependence upon the comity of other States, in enforcing our act and in refraining from enforcing their own, as to a subject which commonly is wholly under the control of the several States, and with which, it has been pointed out, a substantial number have already manifested a purpose to deal by a new and special legislation. No court of any sister State, so far as we are aware, has had occasion to pass upon the precise question here presented.

The decision concludes: "If employees and employers from different States carry their domiciliary personal injury law with them into other jurisdiction, confusion would ensue in the administration of the law, and at least the appearance of inequality among those working under similar conditions. If such a result had been intended by the General Court, it cannot be doubted that it would have been disclosed in unambiguous words."

Correspondence

Early Work in Metallography

To the Editor: In your issue of August 14, which has only just come to my attention on my return from Europe, Mr. Kreuzpointner discusses interestingly the early use of the microscope in iron and steel works. He reminds us of the early contributions of Messrs. Roepper and Garrison, as well as of his own, and takes exception to the following statement I made in a paper presented at the May meeting of the American Iron and Steel Institute: "To the best of my knowledge, Prof. Henry M. Howe was then the only American devoting any time to the microscopical examination of iron and steel." I was then speaking of the year 1891, and I am unable to find any facts in Mr. Kreuzpointner's remarks pointing to the inaccuracy of the above statement. The gentlemen to whom Mr. Kreuzpointner refers were not at that period, so far as I know, "devoting any time to the microscopical examination of iron and steel." Their work, I believe, had attracted the attention of but few, and was then quite forgotten.

In my very brief allusion to the early days of metallography in the United States, it was not my intention to write a history of the development of the science. Should such be written, the early work of Garrison and Kreuzpointner should certainly be mentioned. Of Mr. Roepper's use of the microscope in 1880 I was ignorant.

ALBERT SAUVEUR.

CAMBRIDGE, MASS., September 29, 1913.

To Lessen Rear End Collisions

To the Editor: Most interesting advices appear in your issue of September 18 on how to avoid rear end collisions; but it seems to me the simplest way would be this: If a road cannot run its trains safely in certain kinds of weather at the rate of 60 or more miles an hour, let it try 40 or 20 miles an hour. All passengers must agree with the writer that it is much better to reach New York from three to six hours late, than not to reach New York at all.

CARL FALK.

BUFFALO, N. Y., September 23, 1913.

An expert of the Japanese Government Steel Works, Hattori Zen, has lately returned to Tokio after an inspection of the iron mines of Corea and Manchuria. He states that Corea has a number of mines which have a promising future, yielding excellent ore and now having an annual output of 150,000 tons. This is taken by the Japanese Government works. Over 12,000 men are at present employed in the mines. He also states that the Mitsui Bishi Company is so impressed with the iron ore resources of Corea that the establishment of a blast furnace on the banks of the river Tatung has been proposed.

In a paper by L. Guillet on the "Annealing of Hardened Products" in *Revue de Metallurgie*, the influence of time on the effect of annealing was investigated among other things. Some of the conclusions are: The time of annealing has no influence on the elongation, while the breaking strain is slightly lowered in the case of nickel and more so in hard steel, especially if the time be prolonged, although the result may be influenced by the surface decarburization produced. In all cases the influence of time is very slight, in contradiction to generally accepted views.

The New Iron, Steel and Metal Tariff Rates

The Metal Schedule as Adopted by the Conference Committee, Together with Such Parts of the Free List as Cover Iron, Steel and Metal Products

Below will be found the full text of the metal schedule of the new tariff act, as agreed upon by the Conference Committee of the Senate and House of Representatives, and which will undoubtedly become law this week. As the conferees of the Senate and House have agreed upon these rates, there appears to be no reason for expecting that any further change in them will now be made or suggested in either branch of Congress.

It will be observed that pig iron, spiegeleisen, ferromanganese, scrap, certain forms of semi-finished iron, steel ingots, blooms, slabs and billets made by the Bessemer or open-hearth process and not containing alloys, engraved steel plates for printing securities, ingots for railroad wheels and antimony ore have been placed on the free list. Increases have been made on the House rates on lead-bearing ores and on zinc in blocks, pigs or other forms. The Senate receded from its amendment lowering the House rate on wire rope and increasing the rate on woven wire cloth. The House rate on steel ingots, billets, bars and other forms of steel made by the crucible, electric or cementation process, or containing alloys, has been retained.

It will further be observed that the controversy over the duty on cast-iron pipe has been terminated by making this product dutiable at 10 per cent.

A comparison is made with the rates under the existing Payne tariff, the latter being inserted in brackets []. The new duties being practically all ad valorem, the ad valorem equivalents of the present duties are also inserted, in parentheses (), the computation being based on the iron and steel importations of 1911 and the duties paid thereon. It will be seen that the rates finally adopted conform closely to the rates as reported to the Senate Democratic caucus and printed as a supplement to *The Iron Age* of June 26, 1913. The duties in the present Payne tariff have quite generally been cut about 50 per cent.

SCHEDULE C—Metals and Manufactures of

104. Chrome or chromium metal, ferrochrome or ferrocromium, ferromolybdenum, ferrophosphorus, ferrotitanium, ferrotungsten, ferrovanadium, molybdenum, titanium, tantalum, tungsten or wolfram metal, and ferrosilicon, and other alloys used in the manufacture of steel, not specially provided for in this section [20 to 25 per cent., according to value], 15 per cent. ad valorem.

105. Muck bars, bar iron, square iron, rolled or hammered, round iron, in coils or rods, bars or shapes of rolled or hammered iron not specially provided for in this section [6/10c. per lb.], 5 per cent. ad valorem. (Bar iron 13.80 per cent., round iron 34.03 per cent., charcoal bars 19.17 per cent. in 1911.)

106. Beams, girders, joists, angles, channels, cartruck channels, T's, columns and posts or parts or sections of columns and posts, deck and bulb beams, sashes, frames, and building forms, together with all other structural shapes of iron or steel, whether plain, punched or fitted for use, or whether assembled or manufactured, 10 per cent. ad valorem. [Not assembled, 3/10c. to 4/10c., according to value; assembled, 45 per cent.] (Not assembled, 30.56 per cent. in 1911.)

107. Boiler or other plate iron or steel, and strips of iron or steel, not specially provided for in this section [3/10c. to 6/10c. per lb., according to value]; sheets of iron or steel, common or black, of whatever dimensions, whether plain, corrugated or crimped, including crucible plate steel and saw plates, cut or sheared to shape or otherwise, or unsheared, and skelp iron or steel [5/10c. to 8/10c. per lb.] whether sheared or rolled in grooves, or otherwise, 12 per cent. ad valorem. (Plates 37.68 per cent., common sheets 32.35 per cent., cold rolled sheets 30.03 per cent., saw plates 23.17 per cent. in 1911.)

108. Iron or steel anchors, or parts thereof [1c. per lb.]; forgings of iron or steel, or of combined iron and steel, but not machined, tooled, or otherwise advanced in condition by any process or operation subsequent to the forging process, not specially provided for in this section [30 per cent.], 12 per cent. ad valorem; anti-friction balls, ball bearings, and roller bearings, of iron or steel or other metal, finished or unfinished [45 per cent.], 35 per cent. ad valorem. (Anchors 39.91 per cent., forgings 30 per cent. in 1911.)

109. Hoop, band, or scroll iron or steel not otherwise provided for in this section [3/10c. to 6/10c. per lb.], and barrel hoops of iron or steel, wholly or partly manufactured [1/10c. per lb. extra], 10 per cent. ad valorem.

110. Railway fishplates or splice bars made of iron or steel [3/10c. per lb.], 10 per cent. ad valorem. (In 1911, 19.94 per cent.)

111. All iron or steel sheets, plates, or strips, and all hoop, band, or scroll iron or steel, when galvanized or coated with zinc, spelter, or other metals, or any alloy of those metals [2/10c. per lb. extra duty]; sheets or plates composed of iron, steel, copper, nickel, or other metal with layers of other metal or metals imposed thereon by forging, hammering, rolling, or welding [40 per cent.]; sheets of iron or steel, polished, planished, or glanced [1 1/4c. per lb.], by whatever name designated, including such as have been pickled or cleaned by acid, or by any other material or process, or which are cold rolled, smoothed only, not polished, and such as are cold hammered, blued, brightened, tempered, or polished by any process to such perfected surface finish or polish better than the grade of cold rolled, smoothed only [2/10c. per lb. extra duty]; and sheets or plates of iron or steel, or taggers iron or steel, coated with tin or lead, or with a mixture of which these metals, or either of them, is a component part, by the dipping or any other process, and commercially known as tin plates,terne plates, and taggers tin, and tin plates coated with metal, and metal sheets decorated in colors or coated with nickel or other metals by dipping, printing, stenciling, or other process, 15 per cent. ad valorem. (Galvanized sheets 33.82 per cent., sheets plated by forging 40 per cent., polished sheets 22.86 per cent., pickled sheets 24.27 per cent., cold-rolled strips 35.84 per cent., cold-rolled sheets 29.68 per cent., cold-hammered strips and sheets 32.93 per cent., tin and terne plates 37.55 per cent. in 1911.)

112. Steel bars, and tapered or beveled bars; mill shafting; pressed, sheared, or stamped shapes, not advanced in value or condition by any process or operation subsequent to the process of stamping; hammer molds or swaged steel; gun-barrel molds not in bars; all descriptions and shapes of dry sand, loam, or iron molded steel castings, sheets, and plates; all the foregoing, if made by the Bessemer, Siemens-Martin, open-hearth, or similar processes, not containing alloys, such as nickel, cobalt, vanadium, chromium, tungsten or wolfram, molybdenum, titanium, iridium,

uranium, tantalum, boron, and similar alloys [7/40c. per lb. to 7c. per lb.], 8 per cent. ad valorem; steel ingots, cogged ingots, blooms and slabs, die blocks or blanks; billets and bars and tapered or beveled bars; pressed, sheared, or stamped shapes not advanced in value or condition by any process or operation subsequent to the process of stamping; hammer molds or swaged steel; gun-barrel molds not in bars; alloys used as substitutes for steel in the manufacture of tools; all descriptions and shapes of dry sand, loam, or iron molded castings, sheets, and plates; rolled wire rods in coils or bars not smaller than 20/100 of 1 in. in diameter, and steel not specially provided for in this section, all the foregoing when made by the crucible, electric, or cementation process, either with or without alloys, and finished by rolling, hammering, or otherwise, and all steels by whatever process made, containing alloys such as nickel, cobalt, vanadium, chromium, tungsten, wolfram, molybdenum, titanium, iridium, uranium, tantalum, boron, and similar alloys, 15 per cent. ad valorem. [Most of above carried duty of 7/40c. to 7c. per lb., according to value, and 20 per cent. on value above 40c. per lb.]

113. Steel wool or steel shavings [40 per cent.], 20 per cent. ad valorem.

114. Grit, shot, and sand made of iron or steel, that can be used as abrasives [1c. per lb.], 30 per cent. ad valorem. (In 1911, 72.91 per cent.)

115. Rivet, screw, fence, nail, and other iron or steel wire rods, whether round, oval, or square, or in any other shape, and flat rods up to 6 in. in width ready to be drawn or rolled into wire or strips, all the foregoing in coils or otherwise, including wire rods and iron or steel bars, cold rolled, cold drawn, cold hammered, or polished in any way in addition to the ordinary process of hot rolling or hammering [1½c. per lb. extra duty], not specially provided for in this section, 10 per cent. ad valorem: Provided, That all round iron or steel rods smaller than 20/100 of 1 in. in diameter shall be classed as wire. (Plain rods 14.12 per cent., cold rolled, etc., 14.91 per cent. in 1911.)

116. Round iron or steel wire; wire composed of iron, steel, or other metal [1c. to 1¼c. per lb.], except gold or silver, covered with cotton, silk, or other material; corset clasps, corset steels, dress steels and all flat wires and steel in strips not thicker than No. 15 wire gauge and not exceeding 5 in. in width, whether in long or short lengths, in coils or otherwise, and whether rolled or drawn through dies or rolls, or otherwise produced [35 per cent.]; telegraph, telephone, and other wires and cables composed of metal and rubber, or of metal, rubber, and other materials [40 per cent.]; iron and steel wire coated by dipping, galvanizing, or similar process with zinc, tin, or other metal [2/10c. per lb. extra duty]; all other wire not specially provided for in this section [35 per cent.] and articles manufactured wholly or in chief value of any wire or wires provided for in this section [1c. per lb. extra], all the foregoing 15 per cent. ad valorem; wire heddles and healds [25c. per 1000 and 40 per cent. extra duty], 25 per cent. ad valorem; wire rope [maximum wire duty and 1c. per lb.], 30 per cent. ad valorem. (Plain wire 38.18 per cent.; covered with silk, etc., 35 per cent.; cold hammered 37.07 per cent.; coated 37.23 per cent.; manufactures of wire 44.56 per cent.; heddles 77.72 per cent. in 1911.)

117. No article not specially provided for in this section, which is wholly or partly manufactured from tin plate, terne plate, or the sheet, plate, hoop, band, or scroll iron or steel herein provided for, or of which such tin plate, terne plate, sheet, plate, hoop, band, or scroll iron or steel shall be the material of chief value, shall pay a lower rate of duty than that imposed on the tin plate, terne plate, or sheet, plate, hoop, band, or scroll iron or steel from which it is made, or of which it shall be the component thereof of chief value.

118. No allowance or reduction of duties for partial loss or damage in consequence of rust or of discoloration shall be made upon any description of iron or steel, or upon any article wholly or partly manufactured of iron or steel, or upon any manufacture of iron or steel.

119. All metal produced from iron or its ores, which is cast and malleable, of whatever description or form, without regard to the percentage of carbon contained therein, whether produced by cementation, or converted, cast, or made from iron or its ores, by the crucible, Bessemer, Clapp-Griffith, pneumatic, Thomas-Gilchrist, basic, Siemens-Martin, or open-hearth process, or by the equivalent

of either, or by a combination of two or more of the processes, or their equivalents, or by any fusion or other process which produces from iron or its ores a metal either granular or fibrous in structure, which is cast and malleable, excepting what is known as malleable-iron castings, shall be classed and denominated as steel.

120. Anvils of iron or steel, or of iron and steel combined, by whatever process made, or in whatever stage of manufacture [15½c. per lb.], 15 per cent. ad valorem. (In 1911, 31.95 per cent.)

121. Automobiles, valued at \$2000 or more, and automobile bodies, 45 per cent. ad valorem; automobiles valued at less than \$2000, 30 per cent. ad valorem; automobile chassis, and finished parts of automobiles, not including tires, 30 per cent. ad valorem.

122. Bicycles, motor cycles, and finished parts thereof, not including tires [45 per cent.], 25 per cent. ad valorem.

123. Axles, or parts thereof, axle bars, axle blanks, or forgings for axles, whether of iron or steel, without reference to the stage or state of manufacture, not otherwise provided for in this section [¾c. per lb.], 10 per cent. ad valorem: Provided, That when iron or steel axles are imported fitted in wheels, or parts of wheels, of iron or steel, they shall be dutiable at the same rate as the wheels in which they are fitted.

124. Blacksmiths' hammers, tongs, and sledges, track tools, wedges, and crowbars, whether of iron or steel [1¾c. per lb.], 10 per cent. ad valorem. (In 1911, 17.12 per cent.)

125. Nuts or nut blanks, and washers [1¼c. per lb.], 5 per cent. ad valorem; bolts of iron or steel, with or without threads or nuts, or bolt blanks, finished hinges or hinge blanks [1¼c. per lb.], 10 per cent. ad valorem; spiral nut locks and lock washers, whether of iron or steel [1¼c. per lb.], 30 per cent. ad valorem.

126. Card clothing not actually and permanently fitted to and attached to carding machines or to parts thereof at the time of importation, when manufactured with round iron or untempered round steel wire, 10 per cent. ad valorem; when manufactured with tempered round steel wire, or with plated wire or other than round iron or steel wire, or with felt face, or wool face, or rubber face cloth containing wool [20c. to 55c. per sq. ft.], 35 per cent. ad valorem. (In 1911, 57.34 per cent.)

127. Cast-iron pipe of every description [¼c. per lb.], 10 per cent. ad valorem; cast-iron andirons, plates, stove plates, sadirons, tailors' irons, hatters' irons, and castings and vessels wholly of cast iron [8/10c. per lb.], including all castings of iron or cast-iron plates which have been chiseled, drilled, machined, or otherwise advanced in condition by processes or operations subsequent to the casting process but not made up into articles or finished machine parts [2/10c. per lb. extra duty]; castings of malleable iron not specially provided for in this section [7/10c. per lb.]; cast hollow ware, coated, glazed, or tinned [1½c. per lb.], 10 per cent. ad valorem. (Pipe 16.30 per cent., andirons 11.17 per cent., castings 26.16 per cent., malleable castings 13.80 per cent., hollow ware 20.01 per cent. in 1911.)

128. Chain or chains of all kinds, made of iron or steel, not specially provided for in this section [¾c. to 3c. per lb.], 20 per cent. ad valorem; sprocket and machine chains [not less than 45 per cent.], 25 per cent. ad valorem.

129. Lap-welded, butt-welded, seamed, or jointed iron or steel tubes, pipes, flues, or stays [1c. to 2c. per lb.]; cylindrical or tubular tanks or vessels, for holding gas, liquids, or other material, whether full or empty [30 per cent.]; flexible metal tubing or hose, not specially provided for in this section, whether covered with wire or other material, or otherwise, including any appliances or attachments affixed thereto [30 per cent.]; welded cylindrical furnaces, tubes or flues made from plate metal, and corrugated, ribbed, or otherwise reinforced against collapsing pressure [2c. per lb.], and all other iron or steel tubes, finished, not specially provided for in this section [30 per cent.], 20 per cent. ad valorem. (Tubes 29.01 per cent., cylindrical tanks 29.95 per cent., cylindrical furnaces 45.71 per cent. in 1911.)

130. Penknives, pocketknives, clasp knives, pruning knives, budding knives, erasers, manicure knives, and all knives by whatever name known, including such as are denominatively mentioned in this section, which have folding or other than fixed blades or attachments, and razors, all the foregoing, whether assembled but not fully finished or finished [40 per cent. and up to 20c. each, with 40 per cent. extra]; valued at

not more than \$1 per dozen, 35 per cent. ad valorem; valued at more than \$1 per dozen, 55 per cent. ad valorem: Provided, That blades, handles, or other parts of any of the foregoing knives, razors, or erasers shall be dutiable at not less than the rate herein imposed upon the knives, razors, and erasers, of which they are parts. Scissors and shears, and blades for the same, finished or unfinished, 30 per cent. ad valorem: Provided further, That all articles specified in this paragraph shall, when imported, have the name of the maker or purchaser and beneath the same the name of the country of origin die-sunk conspicuously and indelibly on the blade, shank, or tang of at least one or, if practicable, each and every blade thereof. (Penknives 77.62 per cent., razors 71.30 per cent., scissors and shears 52.55 per cent. in 1911.)

131. Sword blades, and swords and side arms, irrespective of quality or use, in part of metal [50 per cent.], 30 per cent. ad valorem.

132. Table, butchers', carving, cooks', hunting, kitchen, bread, butter, vegetable, fruit, cheese, carpenters' bench, carriers', drawing, farriers', fleshing, hay, tanners', plumbers', painters', palette, artists', and shoe knives, forks and steels, finished or unfinished, without handles, 25 per cent. [not under 40 per cent.], ad valorem; with handles, 30 per cent. ad valorem: Provided, That all the articles specified in this paragraph, when imported, shall have the name of the maker or purchaser, and beneath the same the name of the country of origin indelibly stamped or branded thereon in a place that shall not be covered thereafter.

133. Files, file blanks, rasps, and floats, of all cuts and kinds [25c. to 77½c. per dozen], 25 per cent. ad valorem. (In 1911, 61.16 per cent.)

134. Muskets, air-rifles, muzzle-loading shotguns and rifles, and parts thereof [25 per cent.], 15 per cent. ad valorem.

135. Breech-loading shotguns and rifles, combination shotguns and rifles, and parts thereof and fittings therefor, including barrels further advanced than rough bored only; pistols, whether automatic, magazine, or revolving, or parts thereof and fittings therefor [75c. each and 25 per cent. extra, to \$6 each and 35 per cent. extra], 35 per cent. ad valorem. (In 1911, 45.64 per cent.)

136. Table, kitchen, and hospital utensils or other similar hollow ware composed of iron or steel, enameled or glazed with vitreous glasses [40 per cent.]; table, kitchen, and hospital utensils or other similar hollow ware composed wholly or in chief value of aluminum; all the foregoing not especially provided for in this section, 25 per cent. ad valorem.

137. Needles for knitting or sewing machines [\$1 per 1000 and 25 per cent. extra], latch needles, crochet needles [\$1.15 per 1000 and 35 per cent. extra], and tape needles, knitting and all other needles not specially provided for in this section, bodkins of metal, and needle cases or needle hooks furnished with assortments of needles or combinations of needles and other articles [25 per cent.], 20 per cent. ad valorem; but no articles other than the needles which are specifically named in this section shall be dutiable as needles unless having an eye and fitted and used for carrying a thread. (In 1911, 42.98 per cent.)

138. Fishhooks, fishing rods and reels, artificial flies, artificial baits, snelled hooks, and all other fishing tackle or parts thereof, not specially provided for in this section, except fishing lines, fishing nets and seines, 30 per cent. ad valorem: Provided, That any prohibition of the importation of feathers in this section shall not be construed as applying to artificial flies used for fishing.

139. Steel plates engraved, stereotype plates, electrotype plates, halftone plates, photogravure plates, photo-engraved plates, and plates of other materials, engraved for printing [20 per cent.], plates of iron or steel engraved or fashioned for use in the production of designs, patterns, or impressions on glass in the process of manufacturing plate or other glass [25 per cent.], 15 per cent. ad valorem; lithographic plates of stone or other material engraved, drawn, or prepared, and wet transfer paper or paper prepared wholly with glycerin, or glycerin combined with other materials, containing the imprints taken from lithographic plates [50 per cent.], 25 per cent. ad valorem.

140. Rivets, studs, and steel points, lathed, machined, or brightened, and rivets or studs for nonskidding automobile tires [45 per cent.], and rivets of iron or steel, not

specially provided for in this section [1¼c. per lb.], 20 per cent. ad valorem. (In 1911, 39.76 per cent.)

141. Crosscut saws, mill saws, pit and drag saws, circular saws, steel band saws, finished or further advanced than tempered and polished, hand, back, and all other saws, not specially provided for in this section [5c. per linear ft. to 5c. per lb. and 20 per cent. extra], 12 per cent. ad valorem. (Crosscut saws 17.35 per cent., pit and drag saws 31.44 per cent., circular saws 20 per cent., band saws 30.26 per cent., hand and back saws 25 per cent. in 1911.)

142. Screws, commonly called wood screws, made of iron or steel [3 to 10c. per lb.], 25 per cent. ad valorem. (In 1911, 54.23 per cent.)

143. Umbrella and parasol ribs and stretchers, composed in chief value of iron, steel, or other metal, in frames or otherwise, and tubes for umbrellas, wholly or partially finished [50 per cent.], 35 per cent. ad valorem.

144. Wheels for railway purposes, or parts thereof, made of iron or steel, and steel-tired wheels for railway purposes, whether wholly or partly finished, and iron or steel locomotive, car, or other railway tires or parts thereof wholly or partly manufactured [1¼c. per lb.], 20 per cent. ad valorem (50.63 per cent. in 1911): Provided, That when wheels for railway purposes, or parts thereof, of iron or steel, are imported with iron or steel axles fitted in them, the wheels and axles together shall be dutiable at the same rate as is provided for the wheels when imported separately. (Total paragraph, 50.63 per cent. in 1911.)

145. Aluminum, aluminum scrap, and alloys of any kind in which aluminum is the component material of chief value, in crude form [7c. per lb.], 2c. per lb.; aluminum in plates, sheets, bars, strips, and rods, 3¼c. per lb. [11c. per lb.]; barium, calcium, magnesium, sodium, and potassium, and alloys of which said metals are the component material of chief value [3c. per lb. and 25 per cent.], 25 per cent. ad valorem. (In 1911, 46.19 per cent.)

146. Antimony, as regulus or metal [1¼c. per lb.] (26.98 per cent. in 1911), and matte containing antimony but not containing more than 10 per cent. of lead [1c. per lb.], 10 per cent. ad valorem; antimony, oxide [1¼c. per lb. and 25 per cent.], salts, and compounds of, 25 per cent. ad valorem. (53.07 per cent. in 1911.)

147. Argentine, albata, or German silver, unmanufactured [25 per cent.], 15 per cent. ad valorem. (In 1911, 40.19 per cent.)

148. Bronze powder [12c. per lb.] (57.33 per cent. in 1911), brocades, flitters and metallics, bronze, or Dutch-metal or aluminum, in leaf [6c. per 100 leaves], 25 per cent. ad valorem. (41.06 per cent. in 1911.)

149. Copper, in rolled plates, called braziers' copper, sheets, rods, strips, pipes, and copper bottoms [2¼c. per lb.] (11.48 per cent. in 1911), sheathing or yellow metal of which copper is the component material of chief value, and not composed wholly or in part of iron ungalvanized [2c. per lb.], 5 per cent. ad valorem. (10.97 per cent. in 1911.)

150. Gold leaf [35c. per 100 leaves upward], 35 per cent. ad valorem. (38.65 per cent. in 1911.)

151. Silver leaf [10c. per 100 leaves], 30 per cent. ad valorem. (87.70 per cent. in 1911.)

152. Tinsel wire, lame or lahn, made wholly or in chief value of gold, silver, or other metal [5c. per lb.] (10.45 per cent. in 1911), 6 per cent. ad valorem (10.45 per cent. in 1911); bullions and metal threads, made wholly or in chief value of tinsel wire, lame or lahn [5c. per lb. and 30 per cent.], 25 per cent. ad valorem (35.20 per cent. in 1911), fabrics, ribbons, beltings, toys, or other articles, made wholly or in chief value of tinsel wire, lame or lahn, or of tinsel wire, lame, or lahn, and india rubber, bullions, or metal threads not specially provided for in this section [15c. per lb. and 60 per cent.] (63.76 per cent. in 1911), 40 per cent. ad valorem.

153. Belt buckles, trousers buckles, waistcoat buckles, snap fasteners and clasps by whatever name known, any of the foregoing made wholly or in chief value of iron or steel; hooks and eyes, metallic; steel trousers buttons, and metal buttons; all the foregoing and parts thereof, not otherwise specially provided for in this section, 15 per cent. ad valorem.

154. Lead-bearing ores of all kinds [1¼c. per lb.] containing more than 3 per cent. of lead, ¾c. per lb. on the lead contained therein. [Here follows the usual administrative clause.—EDITOR.]

155. Lead dross [$1\frac{1}{2}$ c. per lb.] (52.77 per cent. in 1911); lead bullion or base bullion, lead in pigs and bars, lead in any form not specially provided for in this section, old refuse lead run into blocks and bars, and old scrap lead fit only to be remanufactured [$2\frac{1}{2}$ c. per lb.] (93.59 per cent. in 1911); lead in sheets, pipe, shot, glaziers' lead, and lead wire [$2\frac{3}{4}$ c. per lb.] (52.75 per cent. in 1911); all the foregoing, 25 per cent. ad valorem on the lead contained therein.

156. Metallic mineral substances in a crude state, and metals unwrought, whether capable of being wrought or not, not specially provided for in this section [20 per cent.], 10 per cent. ad valorem; monazite sand and thorite [4c. per lb.] (44.82 per cent. in 1911); thorium, oxide of and salts of; gas, kerosene, or alcohol mantles treated with chemicals or metallic oxides [40 per cent.], 25 per cent. ad valorem; and gas-mantle scrap consisting in chief value of metallic oxides [45 per cent.], 10 per cent. ad valorem.

157. Nickel, nickel oxide, alloy of any kind in which nickel is a component material of chief value, in pigs, ingots, bars, rods, or plates [6c. per lb.] (16.80 per cent. in 1911), 10 per cent. ad valorem; sheets or strips [35 per cent.], 20 per cent. ad valorem.

158. Pens, metallic, not specially provided for in this section [except gold, 12c. per gross], 8c. per gross; with nib and barrel in one piece [15c. per gross], 12c. per gross.

159. Penholder tips, penholders and parts thereof [5c. per gross and 25 per cent.] (28.95 per cent. in 1911), gold pens [25 per cent.], fountain pens, and stylographic pens [30 per cent.]; combination penholders, comprising penholder, pencil, rubber eraser, automatic stamp, or other attachment [45 per cent.], 25 per cent. ad valorem: Provided, That pens and penholders shall be assessed for duty separately.

160. Pins with solid heads, without ornamentation, including hair, safety, hat, bonnet, and shawl pins; any of the foregoing composed wholly of brass, copper, iron, steel, or other base metal, not plated with gold or silver, and not commonly known as jewelry [35 per cent.], 20 per cent. ad valorem.

161. Quicksilver [7c. per lb.] (13.24 per cent. in 1911), 10 per cent. ad valorem. The flasks, bottles, or other vessels in which quicksilver is imported shall be subject to the same rate of duty as they would be subjected to if imported empty.

162. Type metal, and types [$1\frac{1}{2}$ c. per lb. on the lead contained therein] (33.54 per cent. in 1911), 15 per cent. ad valorem.

163. Watch movements, whether imported in cases or not [75c. each up to \$3 and 25 per cent. each], watch-cases and parts of watches, chronometers, box or ship, and parts thereof, lever clock movements having jewels in the escapement, and clocks containing such movements, all other clocks and parts thereof, not otherwise provided for in this section, whether separately packed or otherwise, not composed wholly or in chief value of china, porcelain, parian, bisque, or earthenware [40 per cent.], 30 per cent. ad valorem; all jewels for use in the manufacture of watches, clocks, or meters, 10 per cent. ad valorem; time detectors, 15 per cent. ad valorem; enameled dials and dial plates for watches or other instruments [3c. each and 40 per cent.] (98.16 per cent. in 1911), 30 per cent. ad valorem: Provided, That all watch and clock dials, whether attached to movements or not, shall have indelibly painted or printed thereon the name of the country of origin, and that all watch movements, and plates, lever clock movements with jewels in the escapement, whether imported assembled or knocked down for reassembling, and cases of foreign manufacture, shall have the name of the manufacturer and country of manufacture cut, engraved, or die-sunk conspicuously and indelibly on the plate of the movement and the inside of the case, respectively, and the movements and plates shall also have marked thereon by one of the methods indicated the number of jewels and adjustments, said numbers to be expressed either in words or in Arabic numerals; and if the movement is not adjusted, the word "unadjusted" shall be marked thereon by one of the methods indicated; and none of the aforesaid articles shall be delivered to the importer unless marked in exact conformity to this direction.

164. Zinc-bearing ores of all kinds, including calamine [free if less than 10 per cent. zinc and graduated up to 1c. per lb.], 10 per cent. ad valorem upon the zinc contained

therein. [The administrative clause attached to paragraph 154, on lead-bearing ores, is repeated here.—EDITOR.]

165. Zinc in blocks, pigs, or sheets, and zinc dust [$1\frac{1}{2}$ c. to $1\frac{3}{4}$ c. per lb.] (28.57 per cent. in 1911); and old and worn-out zinc fit only to be remanufactured [1c. per lb.] (25.60 per cent. in 1911), 15 per cent. ad valorem.

166. Bottle caps of metal, collapsible tubes, and sprinkler tops, if not decorated, colored, waxed, lacquered, enameled, lithographed, electroplated, or embossed in color [$\frac{1}{2}$ c. per lb.] (54.88 per cent. in 1911), 30 per cent. ad valorem; if decorated, colored, waxed, lacquered, enameled, lithographed, electroplated, or embossed in color, 40 per cent. ad valorem.

167. All steam engines [30 per cent.], steam locomotives [45 per cent.], printing presses and machine tools [30 per cent.], 15 per cent. ad valorem; embroidering machines, and lace-making machines, including machines for making lace curtains, nets, or nettings [45 per cent.], 25 per cent. ad valorem; machine tools as used in this paragraph shall be held to mean any machine operated by other than hand power which employs a tool for working on metal.

168. Nippers and pliers of all kinds wholly or partly manufactured [8c. per lb. and 40 per cent.] (59.74 per cent. in 1911), 30 per cent. ad valorem.

169. Articles or wares not specially provided for in this section; if composed wholly or in part of platinum, gold, or silver, and articles or wares plated with gold or silver, and whether partly or wholly manufactured [45 per cent.], 50 per cent. ad valorem; if composed wholly or in chief value of iron, steel, lead, copper, brass, nickel, pewter, zinc, aluminum, or other metal, but not plated with gold or silver, and whether partly or wholly manufactured [45 per cent.], 20 per cent. ad valorem.

Free List

401. Agricultural implements: Plows, tooth and disk harrows, headers, harvesters, reapers, agricultural drills and planters, mowers, horserakes, cultivators, thrashing machines, cotton gins, machinery for use in the manufacture of sugar, wagons and carts, and all other agricultural implements of any kind and description, whether specifically mentioned herein or not, whether in whole or in parts, including repair parts.

404½. Antimony ore, and stibnite containing antimony, but only as to the antimony content.

412. Articles the growth, produce, or manufacture of the United States, when returned after having been exported, without having been advanced in value or improved in condition by any process of manufacture or other means; steel boxes, casks, barrels, carboys, bags, and other containers or coverings of American manufacture exported filled with American products, or exported empty and returned filled with foreign products, including shooks and staves when returned as barrels or boxes; also quicksilver flasks or bottles, iron or steel drums of either domestic or foreign manufacture, used for the shipment of acids, or other chemicals, which shall have been actually exported from the United States; but proof of the identity of such articles shall be made, under general regulations to be prescribed by the Secretary of the Treasury, but the exemption of bags from duty shall apply only to such domestic bags as may be imported by the exporter thereof, and if any such articles are subject to internal revenue tax at the time of exportation, such tax shall be proved to have been paid before exportation and not refunded; photographic dry plates or films of American manufacture (except moving-picture films), exposed abroad, whether developed or not, and films from moving-picture machines, light struck or otherwise damaged, or worn out, so as to be unsuitable for any other purpose than the recovery of the constituent materials, provided the basic films are of American manufacture, but proof of the identity of such articles shall be made under general regulations to be prescribed by the Secretary of the Treasury; articles exported from the United States for repairs may be returned upon payment of a duty upon the value of the repairs at the rate at which the article itself would be subject if imported under conditions and regulations to be prescribed by the Secretary of the Treasury: Provided, That this paragraph shall not apply to any article upon which an allowance of drawback has been made, the reimportation

of which is hereby prohibited except upon payment of duties equal to the drawbacks allowed; or to any article manufactured in bonded warehouse and exported under any provision of law: And provided further, that when manufactured tobacco which has been exported without payment of internal revenue tax shall be reimported it shall be retained in the custody of the collector of customs until internal revenue stamps in payment of the legal duties shall be placed thereon. And provided further, that the provisions of this paragraph shall not apply to animals made dutiable under the provisions of paragraph 405.

419. Bauxite or beauxite, crude, not refined or otherwise advanced in condition from its natural state [\$1 per ton].

421. Bells, broken, and bell metal, broken, and fit only to be remanufactured.

439. Brass, old brass, clippings from brass or Dutch metal, all the foregoing, fit only for remanufacture.

450. Cash registers, linotype and all type-setting machines, sewing machines, typewriters [all 30 per cent.], shoe machinery [45 per cent.], cream separators, valued at not exceeding \$75 [45 per cent.], sand blast machines, sludge machines [both 45 per cent.], and tar and oil spreading machines [45 per cent.] used in the construction and maintenance of roads and in improving them by the use of road preservatives; all the foregoing whether imported in whole or in parts, including repair parts.

452½. Cement, Roman, Portland and other hydraulic [7 to 8c. per 100 lb.].

455. Charcoal [20 per cent.], blood char, bone char or bone black, not suitable for use as a pigment.

456. Chromate of iron or chromic ore.

457. Chromium, hydroxide of, crude.

459. Coal, anthracite, bituminous [45c. per ton], culm, slack, and shale; coke [20 per cent.]; compositions used for fuel in which coal or coal dust is the component material of chief value, whether in briquettes or other form [20 per cent.].

461. Cobalt and cobalt ore.

468. Composition metal of which copper is the component material of chief value, not specially provided for in this section.

469. Copper ore; regulus of, and black or coarse copper, and copper cement; old copper, fit only for remanufacture; copper scale, clippings from new copper and copper in plates, bars, ingots, or pigs, not manufactured or specially provided for in this section.

478. Curling stones, or quoits, and curling-stone handles.

486. Emery ore and corundum, and crude artificial abrasives, not specially provided for.

511. Hones and whetstones.

513. Hoop or band iron, or hoop or band steel, cut to lengths, or wholly or partly manufactured into hoops or ties, coated or not coated with paint or any other preparation, with or without buckles or fastenings, for baling cotton or any other commodity [3/10c. per lb.].

522. Iron ore, including manganiferous iron ore, and the dross or residuum from burnt pyrites [15c. per ton]; iron in pigs, iron kentledge, spiegeleisen [all \$2.50 per ton], wrought iron and scrap and scrap steel [\$1 per ton]; but nothing shall be deemed scrap iron or scrap steel except second-hand or waste or refuse iron or steel fit only to be remanufactured; ferromanganese [\$2.50 per ton]; iron in slabs, blooms, loops or other forms less finished than iron bars [4/10 of 1c. per lb.], and more advanced than pig iron except castings, not specially provided for in this section.

526. Junk, old.

533. Manganese, oxide and ore of.

553. Minerals, crude, or not advanced in value or condition by refining or grinding, or by other process of manufacture, not specially provided for in this section.

555. Models of inventions and of other improvements in the arts, to be used exclusively as models and incapable of any other use.

558. Cut nails and cut spikes of iron or steel [4/10c. per lb.], horseshoe nails [1½c. per lb.], horseshoe nail rods [3/10c. to 6/10c. per lb.], hobnails [1½c. per lb.], and all other wrought-iron or steel nails not specially provided for in this section [1½c. per lb.]; wire staples [not less than 40 per cent.], wire nails made of wrought iron or steel [4/10c. to 1c. per lb.], spikes [4/10c. to ¾c. per lb.], and horse, mule, or ox shoes, of wrought iron or steel

[¾c. per lb.], and cut tacks, brads, or sprigs [5½c. per 1000 to ¾c. per lb.].

559. Needles, hand sewing and darning, and needles for shoe machines [25 per cent.].

577. Pewter and britannia metal, old, and fit only to be remanufactured.

582. Platinum, unmanufactured or in ingots, bars, plates, sheets, wire, sponge, or scrap, and vases, retorts, and other apparatus, vessels, and parts thereof, composed of platinum, for chemical uses.

583. Plumbago.

591. Railway bars, made of iron or steel, and railway bars made in part of steel, T rails, and punched iron or steel flat rails [7/40c. per lb.].

601. Shotgun barrels, in single tubes, forged, rough bored.

615¼. Steel engraved forms for bonds, debentures, stock certificates, negotiable receipts, notes and other securities; and engraved steel plates, dies and rolls, suitable for use in engraving or printing bonds, stock certificates or other securities [20 per cent. ad valorem].

615½. Steel ingots, clogged ingots, blooms and slabs, die blocks or blanks, and billets, if made by the Bessemer, Siemens-Martin, open-hearth or similar processes, not containing alloy, such as nickel, cobalt, vanadium, chromium, tungsten, or wolfram, molybdenum, titanium, iridium, uranium, tantalum, boron, and similar alloys [7/40 of 1c. per lb. to 7c. per lb.].

633. Tin ore, cassiterite or black oxide of tin, tin in bars, blocks, pigs, or grain or granulated, and scrap tin: Provided, that there shall be imposed and paid upon cassiterite, or black oxide of tin, and upon bar, block, pig tin and grain or granulated, a duty of 4c. per lb. when it is made to appear to the satisfaction of the President of the United States that the mines of the United States are producing 1500 tons of cassiterite and bar, block, and pig tin per year. The President shall make known this fact by proclamation, and thereafter said duties shall go into effect.

637. Tungsten-bearing ores of all kinds [10 per cent.].

639. Type, stereotype metal, electrotype metal, linotype composition, all of the foregoing, old and fit only to be remanufactured.

647. All barbed wire [¾c. per lb.], galvanized wire not larger than 20/100 of 1 in. in diameter and not smaller than 8/100 of 1 in. in diameter of the kind commonly used for fencing purposes [2c. per lb.], galvanized wire fencing composed of wires not larger than 20/100 of 1 in. in diameter nor smaller than 8/100 of 1 in. in diameter, and wire commonly used for baling hay or other commodities [not less than 40 per cent.].

The property of the bankrupt Diamond State Steel Company, Wilmington, Del., is being offered for sale by sealed bids by the trustees, George S. Capelle and John Richardson, Jr., 600 Market street, in that city, under a court order. Bids are to be opened publicly at 11 a.m. on Wednesday, October 22. One parcel on which bids are invited covers the open-hearth steel plant, rolling mills, horseshoe works, foundry, machine shops and other finishing departments. Another parcel consists of such personal property as tools, fittings, machine parts, supplies, etc. Other parcels cover real estate, single machines, scrap, etc.

A company to be under the management of F. E. Bachman has leased from the Northern Iron Company the Cedar Point furnace at Port Henry, N. Y., for a term of six months. This venture is to make experiments with the iron ore taken from the deposits at Tahawus in the western part of Essex County. These mines were first opened by the late W. T. Foote, Jr., but never fully developed. The new company will take possession January 1, 1914.

A special number of the Valve World has been issued by the Crane Company, Chicago, devoted to standardized flanges and fittings and giving the new dimensions of fittings as tabulated under the recently adopted American Standard, effective January 1, 1914. The issue also contains the results of extended experiments in the Crane Company laboratories covering the merits of various types of flange joints and on bursting points and bolt strengths.

The Iron and Metal Markets

Rail Inquiry at Chicago

Canada Buys Bridge Steel and Tin Plates

Continued Firmness in Pig Iron—Semi-Finished and Finished Steel Weaker

The conservative attitude of buyers is emphasized as the accumulations on steel works order books are reduced. The announcement of the conference agreement on the metal tariff and the passage of the bill by the House clear up the doubts as to particular items; but apart from inquiries for foreign iron and steel prices and the efforts of dealers on this side to interest European producers in American representation, there are no real tariff developments in the steel trade as yet.

Eastern mills are feeling the falling off in business first, as is always the case; at Pittsburgh the prospect of holding the present rate of operations for some weeks is an important influence. There is no such price cutting as in some other years has marked even the early stages of a period of transition. The Steel Corporation is operating 86 per cent. of its blast furnace capacity and 91 per cent. of its open-hearth steel capacity.

Car builders have not had much encouragement as to new contracts on the present level of prices, but where any business has been offered the steel companies have not been averse to concessions on plates and shapes below 1.35c. Pittsburgh. The Chicago & Northwestern is about to close for 2500 steel under-frame cars and the New York Central has bought 420 steel coaches.

Rail inquiries in the Chicago district amount to nearly a quarter million tons, and it is likely the railroads will arrange for 1913 rollings on a portion of this business. October is expected to bring a number of orders. The Southern Railway has placed 5000 tons with the Ensley mill. In the foreign trade figures are being taken on 10,000 tons for Argentina and 8000 tons for Siam. The last Siamese contract came to this country. British mills have taken 27,000 tons for the Australian government and several thousand tons for the Osaka Railway in Japan. The Lithgow mill in Australia has closed a 17,000-ton contract on which it receives a government bonus of \$7 a ton.

Canada has been a buyer of structural steel, 10,000 tons for bridge work having been closed by one interest in the past week. Bids went in on a 6500-ton section of the New York Subway this week and a Havemeyer warehouse in Brooklyn will require about 5000 tons. There is quite a little railroad bridge work throughout the country.

Canadian purchases of tin plate, chiefly for can companies, have just been made in this country to the extent of 300,000 boxes. Welsh mills made strenuous efforts for this business.

Sheet prices have settled to a point giving less margin over sheet bar costs than existed in the low market of two years ago, 2.05c. for No. 28 black sheets being touched in recent sales. The American Sheet & Tin Plate Company has 75 per cent. of its hot mill capacity operating, both in sheets and tin plates.

In the steel pipe trade some readjustment of prices is looked for, but there is no announcement by manufacturers. A contract for 10 miles of 16-in. pipe has been taken by a Pittsburgh mill, and the Texas Company is in the market for 40 miles of 6-in. and 10 miles of 3 to 4-in. pipe.

Quietness in semi-finished steel is more marked. In

the East the question of the delivered price of duty-free foreign billets it not so much discussed as the absence of demand at any price. In the Pittsburgh district offers of open hearth steel have been made by the smaller mills at less than \$24 for billets and \$25 for sheet bars.

The firmness of the pig iron market is in contrast with the present conditions in finished lines. Comparatively little iron has been bought for 1914 and melters are carrying light stocks. Apparently enough furnaces have gone out to adjust production quite closely to consumption, but the absence of large buying is noticed. The real test of prices for 1914 is yet to come.

Charcoal iron, which went to \$13 at Michigan furnace under the recent liquidation of stocks by one producer, is now 50 cents to \$1 a ton higher.

A Mahoning Valley interest has sold 5000 tons of Bessemer and 5000 tons of basic pig iron to an independent steel company for early shipment, taking sheet bars in payment.

The coke market is softening and contracts for furnace coke, delivery in the next six months, can be made at \$2.15 at Connellsville ovens, though some makers hold for \$2.25 and higher.

A Comparison of Prices

Advances Over the Previous Week in Heavy Type,
Declines in Italics

At date, one week, one month, and one year previous.

Oct. 1, Sept. 24, Sept. 3, Oct. 2.

Pig Iron, Per Gross Ton:	1913.	1913.	1913.	1912.
Foundry No. 2 X, Philadelphia.	\$16.00	\$16.00	\$15.75	\$17.00
Foundry No. 2, Valley furnace.	14.00	14.00	14.00	15.50
Foundry No. 2, S'th'n, Cin'ti...	14.25	14.25	14.25	16.50
Foundry No. 2, Birmingham, Ala.	11.00	11.00	11.00	13.25
Foundry No. 2, furnace, Chicago*	15.00	15.00	15.00	16.50
Basic, delivered, eastern Pa....	15.25	15.25	15.00	16.50
Basic, Valley furnace	14.00	14.00	14.00	15.50
Bessemer, Pittsburgh	16.65	16.65	16.65	17.40
Malleable Bessemer, Chicago*...	15.00	15.00	15.00	17.00
Gray forge, Pittsburgh	14.40	14.25	14.25	15.90
Lake Superior charcoal, Chicago	15.25	14.75	15.25	17.75

Billets, etc., Per Gross Ton:	24.00	24.50	25.00	25.00
Bessemer billets, Pittsburgh...	24.00	24.00	24.50	26.00
Open-hearth billets, Pittsburgh...	25.00	25.00	25.00	26.50
Open-hearth sheet bars, Pgh....	30.00	30.00	30.00	32.00
Open-hearth billets, Philadelphia	25.00	25.00	26.00	28.00
Wire rods, Pittsburgh	27.00	27.00	28.00	28.00

Old Material, Per Gross Ton:	14.00	14.00	14.00	17.50
Iron rails, Chicago	17.50	17.50	17.50	17.00
Iron rails, Philadelphia	12.25	12.25	12.75	15.50
Carwheels, Chicago	13.00	13.00	12.50	14.25
Carwheels, Philadelphia	12.00	12.25	12.25	15.00
Heavy steel scrap, Pittsburgh...	10.00	10.00	10.25	13.25
Heavy steel scrap, Chicago	11.75	11.75	11.50	14.50
Heavy steel scrap, Philadelphia.				

Finished Iron and Steel.	Cents.	Cents.	Cents.	Cents.
Per Pound to Large Buyers:	1.25	1.25	1.25	1.25
Bessemer rails, heavy, at mill...	1.32½	1.32½	1.37½	1.52½
Iron bars, Philadelphia	1.55	1.55	1.60	1.50
Iron bars, Pittsburgh	1.35	1.35	1.40	1.30
Iron bars, Chicago	1.40	1.40	1.40	1.51
Steel bars, Pittsburgh	1.56	1.56	1.56	1.40
Steel bars, New York	1.40	1.40	1.40	1.56
Tank plates, Pittsburgh	1.56	1.56	1.56	1.40
Tank plates, New York	1.40	1.40	1.45	1.56
Beams, Pittsburgh	1.56	1.56	1.61	1.40
Beams, New York	1.40	1.40	1.45	1.56
Angles, Pittsburgh	1.56	1.56	1.61	1.40
Angles, New York	1.35	1.35	1.35	1.50
Skelp, grooved steel, Pittsburgh	1.45	1.45	1.45	1.35
Skelp, sheared steel, Pittsburgh	1.60	1.60	1.50	1.45
Steel hoops, Pittsburgh				

Sheets, Nails and Wire,	2.05	2.10	2.15	2.15
Per Pound to Large Buyers:	3.10	3.10	3.20	3.30
Sheets, black, No. 28, Pittsburgh	1.65	1.65	1.65	1.70
Galvanized sheets, No. 28, Pgh.	1.70	1.70	1.75	1.70
Wire nails, Pittsburgh	1.55	1.60	1.60	1.60
Cut nails, f.o.b. Eastern mills...	1.45	1.45	1.45	1.50
Cut nails, Pittsburgh	2.05	2.05	2.05	2.00
Fence wire, ann'l'd. 0 to 9, Pgh.				
Barb wire, galv., Pittsburgh....				

*The average switching charge for delivery to foundries in the Chicago district is 50c. per ton.

Coke, Connellsville,	Oct. 1,	Sept. 24,	Sept. 3,	Oct. 2,
Per Net Ton at Oven:	1913.	1913.	1913.	1912.
Furnace coke, prompt shipment.	\$2.15	\$2.15	\$2.50	\$2.65
Furnace coke, future delivery.	2.25	2.25	2.50	2.50
Foundry coke, prompt shipment.	2.90	2.90	2.90	3.00
Foundry coke, future delivery.	3.00	3.00	3.00	3.00

Metals,	Cents.	Cents.	Cents.	Cents.
Per Pound to Large Buyers:				
Lake copper, New York.....	16.62½	17.00	16.25	17.87½
Electrolytic copper, New York..	16.50	16.75	16.12½	17.70
Spelter, St. Louis.....	5.45	5.65	5.75	7.50
Spelter, New York.....	5.60	5.80	5.90	7.65
Lead, St. Louis.....	4.50	4.60	4.67½	4.95
Lead, New York.....	4.65	4.75	4.75	5.10
Tin, New York.....	40.75	41.85	43.35	50.25
Antimony, Hallett, New York..	7.75	7.75	7.75	9.37½
Tin plate, 100-lb. box, Pittsburgh	\$3.50	\$3.50	\$3.50	\$3.60

Finished Iron and Steel f.o.b. Pittsburgh

Freight rates from Pittsburgh in carloads, per 100 lb.: New York, 16c.; Philadelphia, 15c.; Boston, 18c.; Buffalo, 11c.; Cleveland, 10c.; Cincinnati, 15c.; Indianapolis, 17c.; Chicago, 18c.; St. Louis, 22½c.; Kansas City, 42½c.; Omaha, 42½c.; St. Paul, 32c.; Denver, 84½c.; New Orleans, 30c.; Birmingham, Ala., 45c.; Pacific coast, 80c. on plates, structural shapes and sheets No. 11 and heavier; 85c. on sheets Nos. 12 to 16; 95c. on sheets No. 16 and lighter; 65c. on wrought pipe and boiler tubes.

Plates.—Tank plates, ¼ in. thick, 6¼ in. up to 100 in. wide, 1.40c. to 1.45c., base, net cash, 30 days. Following are stipulations prescribed by manufacturers with extras:

Rectangular plates, tank steel or conforming to manufacturers' standard specifications for structural steel dated February 6, 1903, or equivalent, ¼ in. and over on thinnest edge, 100 in. wide and under, down to but not including 6 in. wide, are base.

Plates up to 72 in. wide, inclusive, ordered 10.2 lb. per sq. ft., are considered ¼-in. plates. Plates over 72 in. wide must be ordered ¼ in. thick on edge, or not less than 11 lb. per sq. ft., to take base price. Plates over 72 in. wide ordered less than 11 lb. per sq. ft. down to the weight of 3-16 in. take the price of 3-16 in.

Allowable overweight, whether plates are ordered to gauge or weight, to be governed by the standard specifications of the Association of American Steel Manufacturers.

Extras.

Cents per lb.

Gauges under ¼ in. to and including 3-16 in.....	.10
Gauges under 3-16 in. to and including No. 8.....	.15
Gauges under No. 8 to and including No. 9.....	.25
Gauges under No. 9 to and including No. 10.....	.30
Gauges under No. 10 to and including No. 12.....	.40
Sketches (including straight taper plates) 3 ft. and over	.10
Complete circles, 3 ft. in diameter and over.....	.20
Boiler and flange steel.....	.10
"A. B. M. A." and ordinary firebox steel.....	.20
Still bottom steel.....	.30
Marine steel.....	.40
Locomotive fire box steel.....	.50
Widths over 100 in. up to 110 in., inclusive.....	.05
Widths over 110 in. up to 115 in., inclusive.....	.10
Widths over 115 in. up to 120 in., inclusive.....	.15
Widths over 120 in., up to 125 in., inclusive.....	.25
Widths over 125 in. up to 130 in., inclusive.....	.50
Widths over 130 in.....	1.00
Cutting to lengths, under 3 ft., to 2 ft., inclusive.....	.25
Cutting to lengths, under 2 ft., to 1 ft., inclusive.....	.50
Cutting to lengths, under 1 ft.....	1.55

No charge for cutting rectangular plates to lengths 3 ft. and over.

Structural Material.—I-beams, 3 to 15 in.; channels, 3 to 15 in.; angles, 3 to 6 in. on one or both legs, ¼ in. thick and over, and zees, 3 in. and over, 1.40c. to 1.45c. Extras on other shapes and sizes are as follows:

Cents per lb.

I-beams over 15 in.....	.10
H-beams over 18 in.....	.10
Angles over 6 in. on one or both legs.....	.10
Angles, 3 in. on one or both legs, less than ¼ in. thick, as per steel bar card, Sept. 1, 1909.....	.70
Tees, structural sizes (except elevator, hand rail, car-truck and conductor rail).....	.05
Channels and tees, under 3 in. wide, as per steel bar card, Sept. 1, 1909.....	.20 to .80
Deck beams and bulb angles.....	.30
Hand rail tees.....	.75
Cutting to lengths, under 3 ft., to 2 ft. inclusive.....	.25
Cutting to lengths, under 2 ft., to 1 ft. inclusive.....	.50
Cutting to lengths, under 1 ft.....	1.55

No charge for cutting to lengths 3 ft. and over.

Wire Rods and Wire.—Bessemer, open-hearth and chain rods, \$27. Fence wire, Nos. 0 to 9, per 100 lb., terms 60 days or 2 per cent. discount in 10 days, carload lots to jobbers, annealed, \$1.45; galvanized, \$1.85. Galvanized barb wire, to jobbers, \$2.05; painted, \$1.65. Wire nails, to jobbers, \$1.65.

The following table gives the price to retail merchants on fence wire in less than carloads, with the extras added to the base price:

Plain Wire, per 100 lb.								
Nos.	0 to 9	10	11	12 & 12½	13	14	15	16
Annealed	\$1.65	\$1.70	\$1.75	\$1.80	\$1.90	\$2.00	\$2.10	\$2.20
Galvanized	2.10	2.10	2.15	2.20	2.30	2.40	2.80	2.90

Wrought Pipe.—The following are the jobbers' carload discounts on the Pittsburgh basing card on steel pipe (full weight), in effect from August 8, 1913, and iron pipe (full weight), from June 2, 1913:

Steel.				Iron.			
Inches.	Black.	Galv.		Inches.	Black.	Galv.	
¾, 1 and 1½.....	73	52½	¾ and 1.....	66	47		
1½ to 3.....	77	66½	1½.....	65	46		
	80	71½	¾ to 2½.....	69	56		
				72	61		
Lap Weld.				Lap Weld.			
2.....	76	67½	1½.....	56	45		
2½ to 6.....	78	69½	1½.....	67	56		
7 to 12.....	75	64½	2.....	68	58		
13 to 15.....	52	..	2½ to 4.....	70	61		
			4½ to 6.....	70	61		
			7 to 12.....	68	55		

Reamed and Drifted.

1 to 3, butt.....	78	69½	1 to 1½, butt.....	70	59
2, lap.....	74	65½	2, butt.....	70	59
2½ to 6, lap.....	76	67½	1½, lap.....	54	43
			1½, lap.....	65	54
			2, lap.....	66	56
			2½ to 4, lap.....	68	59

Butt Weld, extra strong, plain ends.

¾, 1 and 1½.....	68	57½	¾.....	63	52
1½.....	73	66½	½.....	67	60
¾ to 1½.....	77	70½	¾ to 1½.....	71	62
2 to 3.....	75	71½	2 and 2½.....	72	63

Lap Weld, extra strong, plain ends.

2.....	73	64½	1½.....	65	59
2½ to 4.....	75	66½	2.....	66	58
4½ to 6.....	74	65½	2½ to 4.....	70	61
7 to 8.....	67	56½	4½ to 6.....	69	60
9 to 12.....	62	51½	7 and 8.....	63	53
			9 to 12.....	58	47

Butt Weld, double extra strong, plain ends.

¾.....	63	56½	½.....	57	49
¾ to 1½.....	66	59½	¾ to 1½.....	60	52
2 to 2½.....	68	61½	2 and 2½.....	62	54

Lap Weld, double extra strong, plain ends.

2.....	63	56½	2.....	55	49
2½ to 4.....	65	58½	2½ to 4.....	60	54
4½ to 6.....	64	57½	4½ to 6.....	59	53
7 to 8.....	57	46½	7 to 8.....	52	42

The above discounts are subject to the usual variation in weight of 5 per cent. Prices for less than carloads are two (2) points lower basing (higher price) than the above discounts on black and three (3) points on galvanized.

Boiler Tubes.—Discounts to jobbers, in carloads on lap-welded steel, in effect from May 29, 1913, and standard charcoal-iron boiler tubes, in effect from January 1, 1913, are as follows:

Lap-Welded Steel.		Standard Charcoal Iron.	
1½ and 2 in.....	60	1½ in.....	44
2½ in.....	57	1½ and 2 in.....	48
2½ and 2¾ in.....	63	2½ in.....	44
3 and 3½ in.....	67	2½ to 2¾ in.....	53
3½ to 4½ in.....	69	3 and 3½ in.....	55
5 and 6 in.....	63	3½ to 4½ in.....	58
7 to 13 in.....	60	Locomotive and steamship special grades bring higher prices.	

2½ in. and smaller, over 18 ft., 10 per cent. net extra.
2¾ in. and larger, over 22 ft., 10 per cent. net extra.
Less than carloads will be sold at the delivered discounts for carloads, lowered by two points for lengths 22 ft. and under to destinations east of the Mississippi River; lengths over 22 ft. and all shipments going west of the Mississippi River must be sold f.o.b. mill at Pittsburgh basing discount, lowered by two points.

Sheets.—Makers' prices for mill shipment on sheets of U. S. Standard gauge, in carload and larger lots, on which jobbers charge the usual advance for small lots from store, are as follows, f.o.b. Pittsburgh, terms 30 days net or 2 per cent. cash discount in 10 days from date of invoice:

Blue Annealed Sheets.		Cents per lb.	
Nos. 3 to 8.....		1.55 to 1.60	
Nos. 9 and 10.....		1.60 to 1.65	
Nos. 11 and 12.....		1.65 to 1.70	
Nos. 13 and 14.....		1.70 to 1.75	
Nos. 15 and 16.....		1.80 to 1.85	

Box Annealed Sheets, Cold Rolled.		Cents per lb.	
Nos. 10 and 11.....		1.70 to 1.80	
No. 12.....		1.70 to 1.80	
Nos. 13 and 14.....		1.75 to 1.85	
Nos. 15 and 16.....		1.80 to 1.90	
Nos. 17 to 21.....		1.85 to 1.95	
Nos. 22 and 24.....		1.90 to 2.00	
Nos. 25 and 26.....		1.95 to 2.05	
No. 27.....		2.00 to 2.10	
No. 28.....		2.05 to 2.15	
No. 29.....		2.10 to 2.20	
No. 30.....		2.20 to 2.30	

Galvanized Sheets of Black Sheet Gauge.		Cents per lb.	
Nos. 10 and 11.....		2.10 to 2.20	
No. 12.....		2.20 to 2.30	
Nos. 13 and 14.....		2.20 to 2.30	
Nos. 15 and 16.....		2.35 to 2.45	
Nos. 17 to 21.....		2.50 to 2.60	
Nos. 22 and 24.....		2.65 to 2.75	
Nos. 25 and 26.....		2.80 to 2.90	
No. 27.....		2.95 to 3.05	
No. 28.....		3.10 to 3.20	
No. 29.....		3.25 to 3.35	
No. 30.....		3.40 to 3.50	

Chicago*

CHICAGO, ILL., September 29, 1913.

The outlook for the local market in finished steel products continues to hang upon the anticipated buying by the railroads centering here. At Chicago there is more tangible basis for this anticipation perhaps than elsewhere. Car builders are disposed to believe that not only rails and track supplies but a liberal amount of rolling stock will be included in the railroad requisitions. This opinion is founded upon the miscellaneous and sub rosa orders now being placed and upon buying programmes with which the car builders appear to be familiar. The general market, however, lacks information as to how long that buying may be delayed, and current business indicates a decided conservatism accompanied by a hand-to-mouth buying for immediate delivery. Structural lettings are light and mill orders, while numerous, are uniformly for small tonnage. Practically the only inquiry for car steel covers the 2500 steel underframe cars to be purchased by the Chicago & Northwestern Railway. Specifications for steel bars constitute a supporting element in the market and with the possible exception of those to car builders, concessions from the 1.40c. Pittsburgh basis are denied to the general buyer. Bar-iron prices are very weak and irregular. The pig-iron market appears to be increasingly firm, the most marked improvement being shown in connection with the charcoal-iron situation. For this grade of iron the price has been advanced from 50c. to \$1 per ton. Current sales are generally for prompt shipment with very light inquiry for any delivery. The weakness of the scrap market is unchecked in the face of heavy offerings of scrap from all of the railroads.

Pig Iron.—The heavy liquidation of its stocks by one of the largest producers of charcoal iron has resulted in its being so well sold up for the balance of the year as to warrant a decided advance in its price. This interest is now quoting \$14 at the furnace and upward, or \$15.75 to \$16.25 at Chicago. It is still possible, however, to secure charcoal iron at \$15.25 Chicago. Sales are very light, as with all other grades of iron. Except for a moderate tonnage of Southern iron placed for delivery in the first quarter on the basis of \$11.50 Birmingham, pig iron buying is limited to small tonnages for early delivery, apparently for the purpose of filling in on requirements during the balance of the year. For immediate shipment, \$11.25 can be done on standard Birmingham grades. The price of \$11, which was made in the early part of last week to a local stove manufacturer, seems now to be out of line with the market. For the remainder of the year and for the first quarter, \$11.50 is commonly asked. Local irons are established with decided firmness on the basis of \$15 at the furnace. The Iroquois Iron Company blew in a third stack in the past week, but has not yet fixed a date for blowing out the other stack for which repairs have been thought necessary. The following quotations are for iron delivered at consumers' yards, except those for Northern foundry, malleable Bessemer and basic iron, which are f.o.b. furnace and do not include a local switching charge averaging 50c. a ton:

Lake Superior charcoal, Nos. 1, 2, 3, 4.....	\$15.25 to \$15.75
Northern coke foundry, No. 1.....	15.50 to 16.00
Northern coke foundry, No. 2.....	15.00 to 15.50
Northern coke foundry, No. 3.....	14.50 to 15.00
Southern coke, No. 1 foundry and No. 1 soft.....	16.10 to 16.60
Southern coke, No. 2 foundry and No. 2 soft.....	15.60 to 16.10
Southern coke, No. 3.....	15.10 to 15.60
Southern coke, No. 4.....	14.60 to 15.10
Southern gray forge.....	14.60 to 15.10
Southern mottled.....	14.10 to 14.60
Malleable Bessemer.....	15.00 to 15.50
Standard Bessemer.....	18.40
Basic.....	15.00 to 15.50
Jackson Co. and Kentucky silvery, 6 per cent.....	18.40
Jackson Co. and Kentucky silvery, 8 per cent.....	19.40
Jackson Co. and Kentucky silvery, 10 per cent.....	20.40

Rails and Track Supplies.—Several rail orders, each less than 1000 tons, were placed with local mills in the week, together with one lot of 2000 tons for a local belt line. For delivery in 1914 practically every road that ordinarily buys in this market has made inquiry. These inquiries give promise of as liberal tonnages as were taken last year, but the date of buying, while apparently imminent, is still problematical. We quote standard railroad spikes at 1.70c. to 1.75c., base; track bolts with square nuts, 2.25c., base, all in carload lots, Chicago; tie plates, \$30 to \$32, net ton; standard section Bessemer rails, Chicago, 1.25c., base; open hearth, 1.34c.; light rails, 25 to 45 lb., 1.25c.; 16 to 20 lb., 1.30c.; 12 lb., 1.35c.; 8 lb., 1.40c.; angle bars, 1.50c., Chicago.

Structural Material.—The principal inquiry for cars is that of the Chicago & Northwestern Railway, which is taking prices on from 2000 to 2500 steel underframe box cars. Competition among car builders for this

business is decidedly keen. At the same time the aggregate of miscellaneous car orders is considerable, including 25 baggage and mail cars for the Chicago, Burlington & Quincy, and 135 passenger cars for the Great Northern Railway. For the Northwestern cars from 8000 to 10,000 tons of steel will be needed. In this section the lettings of fabricated steel were the smallest in point of tonnage for many weeks, the only contracts reported being 178 tons for the new coal-handling plant of the Minnesota Steel Company and 286 tons for a bridge at Roseburg, Ore., both taken by the American Bridge Company. Among local fabricators with one exception work is being sought with considerable eagerness, and for the most part orders now under way could be completed within 60 days. The indications are that the trade in general is continuing to pay 1.45c., Pittsburgh, for its structural shapes from mill. We quote for Chicago delivery from mill 1.63c.

The fact that buying is so generally of a hand-to-mouth variety contributes to the number of orders placed with local warehouses. Tonnages generally are reported as small, but in number of orders the local warehouse business closely approaches normal volume. From store we quote for Chicago delivery 1.95c.

Plates.—The West is originating some miscellaneous business which will contribute to current plate tonnage in the form of locomotives, the Chicago & Northwestern Railway being in the market for 40, and other Western roads for miscellaneous lots of from 1 to 10. On a substantial portion of such business as is going prices equivalent to 1.40c., Pittsburgh, continue to be obtainable. Other steel companies which made definite sales during the period of higher prices report the receipt of daily specifications on the basis of 1.45c. and higher. For Chicago delivery from mill we quote 1.58c. to 1.63c.

Out of store there is a very limited call for plates except to special cutting specifications. For Chicago delivery from warehouse we quote 1.95c.

Sheets.—The situation as regards sheets shows practically no change from the status of a week ago. Concessions for desirable business continue to be the rule. From the standpoint of tonnage the volume of business might be greatly improved. We quote for Chicago delivery from mill: No. 10 blue annealed, 1.78c.; No. 28 black, 2.33c.; No. 28 galvanized, 3.33c.

While store prices on sheets have not followed the irregularities of mill quotations, it has been largely because the volume of business has been insufficient to create a pressure upon them. We quote for Chicago delivery from store, No. 10 blue annealed, 2.15c.; No. 28 black, 2.75c.; No. 28 galvanized, 4c.

Bars.—The prices of bar iron in this market continue to recede, and orders have been taken during the past week on a basis as low as 1.30c. at the mill. A wide irregularity in quotations has obtained and where such delivery has been asked as permitted the naming of a premium price as much as 1.40c. has been secured. An active demand for steel reinforcing bars is noted in conjunction with the rush of concrete work at this season of the year. Standard bar specifications continue in scheduled volume and prices are well maintained on the basis of 1.40c., Pittsburgh. We quote for mill shipment as follows: Bar iron, 1.35c. to 1.37½c.; soft steel bars, 1.58c.; hard steel bars, 1.50c.; shafting in carloads, 60 per cent. off; less than carloads, 55 per cent. off.

For delivery from store we quote soft steel bars, 1.85c.; bar iron, 1.85c.; reinforcing bars, 1.85c. base, with 5c. extra for twisting in sizes ½ in. and over, and usual card extras for smaller sizes; shafting 55 per cent. off.

Rivets and Bolts.—Prices for rivets in this market are increasingly soft and business of ordinary desirability can be placed without difficulty on the basis of 1.95c. Chicago. The importance of bolt transactions has decreased to a minimum. We quote from mill as follows: Carriage bolts up to ¾ x 6 in., rolled thread, 75-10-7½; cut thread, 75-12½; larger sizes, 70-12½; machine bolts up to ¾ x 4 in., rolled thread, 75-10-12½; cut thread, 75-10-7½; large size, 70-10-5; coach screws, 80-12½-5; hot pressed nuts, square head, \$6 off per cwt.; hexagon, \$6.70 off per cwt. Structural rivets, ¾ to 1¼ in., 1.08c. to 2.03c., base, Chicago, in carload lots; boiler rivets, 10c. additional.

Out of store we quote for structural rivets, 2.70c., and for boiler rivets, 2.90c. Machine bolts up to ¾ x 4 in., 70-5-10; larger sizes, 70-7½; carriage bolts up to ¾ x 6 in., 75-5; larger sizes, 70-7½ off. Hot pressed nuts, square head, \$5.50, and hexagon, \$6.20 off per cwt.

Wire Products.—The booking of wire tonnage has progressed freely and prices appear to be on a substantial basis. Prices to jobbers are as follows: Plain wire, No. 9 and coarser, base, \$1.63; wire nails, \$1.83; painted barb wire, \$1.83; galvanized, \$2.20; polished staples, \$1.83; galvanized, \$2.15, all Chicago.

Cast-Iron Pipe.—In the West the only municipal letting of consequence which materialized during the

past week was one for 300 tons at Lenox, Iowa. For the Panama Canal an order has just been placed with the United States Cast Iron Pipe & Foundry Company for 3800 tons of 30-in pipe. We quote as follows, per net ton, Chicago: Water pipe, 4-in., \$28; 6 to 12 in., \$26; 16-in. and up, \$25, with \$1 extra for gas pipe.

Old Material.—That scrap prices in this territory have been brought down to a level closely approaching the cost of accumulating and grading is evidenced in part by the absence of further declines and by the fact that country scrap is no longer coming in. At the prices now obtainable the country dealer apparently finds it unprofitable to move the material gathered in his district and holds it for a better market. If the railroad offerings of scrap, which now appear to be ample for meeting consumers' requirements, continue to materialize at the present rate there is little hope of higher values in the face of the additional country accumulation. The lists of railroad scrap appearing during the past week include large lists from the Erie and the Baltimore & Ohio, 4200 tons from the Chicago & Northwestern Railway, in which are 500 tons of No. 1 wrought and 750 tons of steel rail; 3500 tons from the Chicago, Rock Island & Pacific, of which 500 tons is No. 1 wrought and 350 tons old carwheels, and 500 tons from the Toledo, St. Louis & Western. We quote for delivery at buyers' works, Chicago and vicinity, all freight and transfer charges paid, as follows:

Per Gross Ton.	
Old iron rails	\$14.00 to \$14.50
Old steel rails, rerolling	12.25 to 12.75
Old steel rails, less than 3 ft.	11.25 to 11.75
Relaying rails, standard section, subject to inspection	24.00
Old carwheels	12.25 to 12.75
Heavy melting steel scrap	10.00 to 10.50
Frogs, switches and guards, cut apart	10.00 to 10.50
Shoveling steel	9.75 to 10.25
Steel axle turnings	7.25 to 7.75
Per Net Ton.	
Iron angles and splice bars	\$13.25 to \$13.75
Iron arch bars and transoms	13.50 to 14.00
Steel angle bars	9.50 to 10.00
Iron car axles	20.25 to 20.75
Steel car axles	15.25 to 15.75
No. 1 railroad wrought	10.00 to 10.25
No. 2 railroad wrought	9.25 to 9.50
Cut forge	9.25 to 9.50
Steel knuckles and couplers	9.75 to 10.25
Steel springs	10.00 to 10.50
Locomotive tires, smooth	11.00 to 11.50
Machine shop turnings	4.90 to 5.15
Cast and mixed borings	4.50 to 5.00
No. 1 busheling	8.50 to 9.00
No. 2 busheling	6.50 to 7.00
No. 1 boilers, cut to sheets and rings	7.00 to 7.50
Boiler punchings	10.50 to 11.00
No. 1 cast scrap	10.50 to 11.00
Stove plate and light cast scrap	9.50 to 10.00
Railroad malleable	10.00 to 10.50
Agricultural malleable	9.00 to 9.50
Pipes and flues	7.50 to 7.75

Philadelphia

PHILADELPHIA, PA., September 30, 1913.

With the enactment of the new tariff, which places on the free list a number of important crude and finished iron and steel products, practically assured in a few days, the trade has begun to figure more seriously just how it will be affected by foreign competition. At this time the pig-iron market does not appear to be seriously menaced, as at present prices abroad importation would not be profitable on the Atlantic seaboard, particularly where any freight charges for inland delivery would have to be added. In finished and semi-finished products, however, the situation is different, as delivery can now be made in some classes of foreign material at points adjacent to the Atlantic coast at lower prices than present domestic quotations. It is generally believed that domestic prices will be lowered to meet competition from abroad, but there has yet been no definite action. With few exceptions, domestic orders for steel products have been smaller, in some lines 20 to 25 per cent. less in September than in August, buyers hesitating in view of probable lower prices. The pig-iron movement during the past week has also been lighter, but prices remain firm. Old material continues to drag and coke remains weak.

Iron Ore.—Buyers are entirely disinterested. Deliveries, while curtailed, are heavier than many consumers desire. Current reports that the Canadian Venezuela Ore Company would greatly increase shipments of its Imataca ore in the near future appear to be without confirmation. Importations at this point during the week ended September 27 included 18,400 tons from St. Johns, 4800 tons from New Brunswick, 4956 tons from Sweden and 17,700 tons from Cuba.

Pig Iron.—The market has been quieter. A fair movement in small lots of foundry iron continues, and

the strength of prices appears fully maintained. That consumers are melting iron at a good rate is believed to be evidenced in the urgent demand for deliveries of foundry grades, even in small lots, and in a number of instances consumers have been asking for immediate shipments against iron bought for later delivery. With furnaces pretty well sold up, producers are less anxious for business and quieter buying has not had any effect on the situation. Current sales of standard brands of eastern Pennsylvania No. 2 X foundry continue to be made at a rather wide range of prices. It is pretty well established that \$16, delivered, is the minimum asking price for this grade and seldom are concessions made, unless at a competitive freight rate point. Some sales have been made at \$16.25, and scattered lots are sold by some producers at \$16.50. There is little demand for large tonnages in the higher grades of foundry iron, and negotiations for deliveries covering the first quarter and half of next year are less in evidence. In low grade iron the demand is still active. Several Delaware River cast-iron pipe makers are actively in the market, and sales of 1000 and 500 ton lots have been made. One large consumer would purchase upward of 15,000 tons, at a price. Current sales of low grade iron have been made at prices ranging from \$15 to \$15.25 delivered. Importation of Middlesbrough iron by cast-iron pipe makers could not, it is contended, be figured as profitable at present prices, even on a duty free basis, with practically no transportation charge on arrival. Virginia pig iron has been moving a trifle more freely. Most of the sales are in small lots, and urgent delivery is largely requested. Practically all sales for remainder of the year shipment have been made at the basis of \$13, Virginia furnace, for No. 2 X foundry. A moderate movement continues in rolling mill forge. Few sales have exceeded 500 tons, with prices ranging from \$15 to \$15.25 delivered. An Eastern consumer has purchased 500 tons of malleable Bessemer for early delivery. The steel making grades are quiet. Some inquiry for basic, previously reported, is before the trade, with asking prices for this year's shipment ranging from \$15.25 to \$15.50 delivered. A little better inquiry for standard analysis low phosphorus iron has developed, although little has been done for delivery in this immediate district. The general range of pig-iron prices is unchanged. Standard brands, for delivery in buyers' yards in this district, shipment over the remainder of the year, are quoted as follows, with advances of 50c. a ton named for first quarter and half of next year:

Eastern Pennsylvania No. 2 X foundry	\$16.00 to \$16.25
Eastern Pennsylvania No. 2 plain	15.75 to 16.00
Virginia No. 2 X foundry	15.80 to 16.25
Virginia No. 2 plain	15.75 to 16.00
Gray forge	15.00 to 15.25
Basic	15.25 to 15.50
Standard low phosphorus	23.00 to 23.50

Ferroalloys.—The reduction in the price of ferromanganese to \$52.50, seaboard (or, as it is also being quoted, \$50 seaboard, duty free), has not resulted in any marked improvement in the demand. Several small sales for early shipment have been made at the new basis, but there is no forward buying. In view of the early enactment of the new tariff placing ferromanganese on the free list, most of the current importations are being placed in warehouse. A little more inquiry has come out for ferrosilicon, but few sales are made. Twelve per cent. furnace ferrosilicon is quoted at \$27.30 delivered in this vicinity.

Billets.—The market is in an uncertain stage. Buyers are heding off pending the passing of the tariff bill, which places billets on the free list. At present prices abroad foreign billets can be delivered at nearby seaboard points, duty free, at prices materially below the current prices for domestic steel. Billet makers are not holding prices at recent quotations, but would be glad to accept business at \$25 delivered, for basic open-hearth rolling billets, and on good orders would shade that price. It is more the case of getting orders than standing on the price. The leading Eastern billet maker is operating at two-thirds. Quotations are entirely nominal at \$25 delivered for rolling steel and \$30 for ordinary analysis forging steel.

Plates.—The volume of business coming to mills in this district is smaller, although one interest is able to maintain full capacity operations. Current inquiries of any size are slow in closing, and most of the orders taken are small and of a miscellaneous character. Universal plates are in lighter demand than sheared plates. Reports that one of the Delaware River shipbuilders had an order for two vessels requiring 3000 tons of plates are said to be premature, but a large volume of

ship plate business is pending. Prices are unchanged. On small lots, 1.60c., delivered in this district, is still obtained but for general business 1.55c. here is the usual quotation.

Structural Material.—There has been a better volume of small fabricated work placed in this district, mostly bridge work, including four small bridges, aggregating 750 tons, for the Philadelphia & Reading and a 200-ton bridge over G street. The disposition of the Ford Motor Company building appears unsettled, and it is reported that it is being redesigned and also that it might be changed to concrete. Plans are reported under way for a new bridge to be erected by the Pennsylvania Railroad in Trenton, N. J. The proposed St. Charles Hotel addition in Atlantic City, some 1500 tons, is again up. The proposed South Penn Square Building, which was to be 10 stories, has been reduced to six stories and will require less than 1000 tons. Mills have been receiving fewer plain-shape orders recently, business having receded sharply since the middle of September. Current quotations on plain shapes, delivered here, range from 1.55c. to 1.60c., according to tonnage, and prices are reported weak.

Sheets.—Eastern mills now meet the recent reduction in prices made by Western mills. Business is in fair volume, but made up mostly of small daily orders so that while mills are fairly busy, operating at full capacity in some departments, there is not a very large volume of orders ahead. Western No. 10 blue annealed sheets are quoted at 1.75c. to 1.80c., delivered in this district, which prices are met by Eastern mills when necessary to get the business.

Bars.—The demand for both iron and steel bars has been light. Specifications on contracts have been comparatively good, but mill operations have been somewhat irregular. Prices have been fairly well maintained, with common iron bars at 1.32½c. delivered, and better grades ranging from 1.35c. to 1.42½c. Steel bars, while reported weak, have been maintained at 1.55c., delivered in this district.

Coke.—Sales of furnace coke for delivery over the remainder of the year have been more active, one transaction involving 10,000 tons and another 6000 tons at \$2.25 at oven having been closed. Standard coke has been quoted down to \$2.20 at oven, but only in small prompt lots. Forward furnace coke continues to be held at \$2.50 at oven. Moderate sales of foundry coke are made at prices ranging from \$3 to \$3.15 at oven. The following range of prices, per net ton, is named for delivery in buyer's yards in this vicinity:

Connellsville furnace coke	\$4.25 to \$4.65
Connellsville foundry coke	4.90 to 5.35
Mountain furnace coke	4.00 to 4.25
Mountain foundry coke	4.50 to 4.75

Old Material.—While there has been a moderate small lot movement in some grades the market lacks snap, and both buyers and sellers are awaiting developments. There has been little activity in heavy melting steel, business being confined to transactions among brokers. The demand for rolling-mill grades is easier, and lower prices have developed for No. 1 railroad wrought. A shade more business is moving in machinery cast, and better prices have been obtained for stove plate and railroad grates. More inquiry is noted for turnings, particularly heavy turnings. Quotations are still to a certain extent nominal. An approximate range for delivery in buyers' yards in this district, covering eastern Pennsylvania, taking freight rates varying from 35c. to \$1.35 per gross ton, is as follows:

No. 1 heavy melting steel	\$11.75 to \$12.00
Old steel rails, rerolling (nominal)	14.50 to 15.00
Low phosphorus heavy melting steel scrap (nominal)	16.00
Old steel axles	18.50 to 19.00
Old iron axles (nominal)	25.00
Old iron rails	17.50 to 18.00
Old carwheels	13.00 to 13.50
No. 1 railroad wrought	14.50 to 15.00
Wrought-iron pipe	11.25 to 11.50
No. 1 forge fire	10.00 to 10.25
No. 2 light iron (nominal)	6.00
No. 2 busheling (nominal)	8.00 to 8.50
Wrought turnings	8.00 to 8.50
Cast borings	8.25 to 8.50
Machinery cast	13.50 to 14.00
Grate bars, railroad	10.00 to 10.50
Stove plate	10.00 to 10.50
Railroad malleable (nominal)	11.00 to 11.50

Wade & Co., iron and steel merchants and foundry and mill supplies, announce the removal of their offices from 1639 Washington avenue to rooms 503, 504 and 505 Weightman Building, 1524 Chestnut street, Philadelphia, Pa.

Cincinnati

CINCINNATI, OHIO, October 1, 1913.—(By Telegraph.)

Pig Iron.—Quotations in the South have been advanced, and as far as is known practically every furnace is holding No. 2 foundry at \$11.50, Birmingham basis, for prompt shipment. Buyers do not seem willing to take hold at this figure, and as a consequence there is very little spot business and not enough to warrant advancing prices this week. There is a small quantity of resale iron obtainable at the present minimum quotation, probably sufficient to take care of immediate wants. However, indications point to the successful establishment of the \$11.50 spot quotation within a short time. It is already in force for first half business, and a few furnaces are refusing orders at anything below \$12. Although conditions in this immediate territory are not as satisfactory as in other sections, the general melt is increasing, and drawing on yard stocks to fill specifications is a daily occurrence in the South. First half sales are more satisfactory, although there is no general buying movement to report as yet. The local melter mentioned last week closed for 600 tons of Southern foundry iron. An Indiana consumer took 1000 tons of No. 2 foundry and 1500 tons of the same grade was contracted for by an Ohio firm. The inquiry is decidedly better, but it is all for forward shipment. An Indiana consumer wants 4000 tons of Southern foundry grades, and there are several unclosed orders in the same territory for lots running as high as 1000 tons. Northern prices show no signs of improving. Both foundry and malleable are quoted at \$14, Ironton, and orders have been booked at this figure with deliveries extending into the first quarter, although the regular quotation for either first quarter or half shipment is 50c. a ton higher. Malleable has been comparatively active lately. A sale of 2500 tons to a Central Western manufacturer is reported, and an Indiana company booked 500 tons, both for first half shipment. An inquiry for 1000 tons from the same territory is also being worked. On Lake Superior charcoal prices are unchanged and a Michigan melter booked 1000 tons for shipment this year. Napier furnace will blow in this week. Based on freight rates of \$3.25 from Birmingham and \$1.20 from Ironton we quote f.o.b. Cincinnati as follows:

Southern coke, No. 1 foundry and 1 soft	\$14.75 to \$15.25
Southern coke, No. 2 foundry and 2 soft	14.25 to 14.75
Southern coke, No. 3 foundry	13.75 to 14.25
Southern, No. 4 foundry	13.25 to 13.50
Southern gray forge	12.75 to 13.25
Ohio silvery, 8 per cent. silicon	18.20 to 18.70
Southern Ohio coke, No. 1	16.20 to 16.70
Southern Ohio coke, No. 2	15.20 to 15.70
Southern Ohio coke, No. 3	14.95 to 15.45
Southern Ohio malleable Bessemer	15.20 to 15.45
Basic, Northern	15.20 to 15.45
Lake Superior charcoal	16.25 to 17.25
Standard Southern carwheel	27.25 to 27.75

(By Mail)

Coke.—The car shortage situation in the Wise County district has become acute. Shipments on contracts are hard to make, and as a consequence producers in that district are slow about taking new business. One large interest has set a price of \$3.50 per net ton at oven for 72-hr. coke, for either prompt or future movement. Furnace coke is also held at a premium, although it is probable that \$2.50 might be done, provided the customer did not wish prompt shipment. Although there are a number of reports in circulation as to quotations in the Connellsville field, \$2.50 for either prompt or first half shipment is the recognized price here on standard brands. Foundry coke averages \$3 per net ton at oven. The same prices are quoted by Pocahontas producers, although at least one of them is unwilling to take business below \$2.75 for furnace coke and between \$3 to \$3.25 for foundry grades. New business in all three fields is light.

Finished Material.—The local mill reports a somewhat better demand for sheets. While prices are a trifle firmer than last week, they are below quotations for the latter part of last month. The mill price, Cincinnati, on No. 28 black sheets is 2.20c. and on galvanized sheets 3.25c. Dealers are quoting steel bars at 1.95c. to 2c. from warehouse and structural material at 2.05c. to 2.10c. Little business is coming in, but specifications on old contracts are fairly satisfactory. There is a slackening demand for wire nails from the wholesale hardware houses, but many of them have a sufficient quantity contracted for and in stock to run them through the year.

Old Material.—With practically few exceptions, dealers report business as dull as at any time this year.

Prices on practically all classes of scrap are weak, and, while it seems as if the bottom had been reached, neither buyers nor sellers are anxious to do business. The minimum prices given below represent what buyers are willing to pay for delivery in their yards, southern Ohio and Cincinnati, and the maximum quotations are dealers' prices f.o.b. yards:

Per Gross Ton.	
Bundled sheet scrap	\$7.00 to \$7.50
Old iron rails	12.00 to 12.50
Relaying rails, 50 lb. and up.	19.75 to 20.25
Rerolling steel rails	11.00 to 11.50
Melting steel rails	9.50 to 10.00
Old carwheels	10.75 to 11.25
Per Net Ton.	
No. 1 railroad wrought	\$9.00 to \$9.50
Cast borings	4.50 to 5.00
Steel turnings	4.50 to 5.00
No. 1 cast scrap	9.00 to 9.50
Burnt scrap	6.50 to 7.00
Old iron axles	16.75 to 17.25
Locomotive tires (smooth inside) ..	10.25 to 10.75
Pipes and flues	6.00 to 6.50
Malleable and steel scrap	7.50 to 8.00
Railroad tank and sheet scrap	4.75 to 5.25

Cleveland

CLEVELAND, OHIO, September 30, 1913

Iron Ore.—Some low-grade ore is being offered at low prices. However, furnaces are well supplied and it is stated that owners of this ore are having difficulty in disposing of it. If any additional sales are made this season, they will be in very small lots. Although lower prices are expected to prevail next year, there is no probability of lower quotations on standard grades this season. Shipments down the lakes are coming forward in a moderate volume. Some consumers have their yards well filled and are not ready to take their ore. As shippers are generally well up on their quotas it is expected that the late movement will be rather light and that there will be an earlier closing of the season of navigation. We quote prices as follows: Old range Bessemer, \$4.40; Mesaba Bessemer, \$4.15; old range non-Bessemer, \$3.60; Mesaba non-Bessemer, \$3.40.

Pig Iron.—Efforts to get an advance of 25c. to 50c. a ton for foundry iron for next year's delivery appear so far to have been unsuccessful, and some of the Lake and Valley furnace companies are making sales for delivery extending through the first quarter at current prices, but claim not to be naming these prices for delivery through the entire first half. The market is quiet. Sales are being made, but they are all in small lots. There is no demand for steel making iron. The only foundry-iron inquiry of any size during the week was from the leading sanitary interest for 2000 to 3000 tons of Nos. 2 and 3 for last quarter delivery. In the Valley, quotations on No. 2 foundry range from \$14 to \$14.50, but the minimum price can possibly be shaded for prompt shipment. In Cleveland, No. 2 foundry is quoted at \$14 at furnace for outside shipment and \$14.50 at furnace for local delivery. The consumption continues heavy and some producers are shipping out iron faster than they are making it. We note the sale of two lots of Southern charcoal iron in Pittsburgh, one of 1500 tons and the other of 500 tons, both for first half delivery. The Southern market is fairly firm at \$11.50, Birmingham, for the last quarter. However, some No. 2 Southern can still be had at \$11 for prompt shipment. For prompt shipment and for the last quarter we quote, delivered Cleveland, as follows:

Bessemer	\$16.65
Basic	14.90
Northern No. 2 foundry	\$14.65 to 15.00
Southern No. 2 foundry	15.35 to 15.85
Gray forge	14.25
Jackson County silvery, 8 per cent. silicon ..	18.55 to 19.05

Coke.—Furnace coke that is guaranteed to be of standard grade is being offered at \$2.15 per net ton at oven for any delivery up to April 1 of next year. There is some inquiry, but consumers are inclined to hold off to see if prices will go any lower. There is little demand for foundry grades, but prices are firm. We quote standard Connellsville foundry at \$3 per net ton at oven for prompt shipment and contract.

Finished Iron and Steel.—The market is not active. New business is almost entirely in small lots. Generally the price situation is unchanged. Steel bars are very firm at 1.40c. Pittsburgh, and no shading in this market is reported on structural material. Plates are quite generally quoted at 1.40c. As mills are getting caught up on deliveries they are more eager for new orders. In structural work T. H. Brooks & Co. have taken about 200 tons for an addition to the Shaw High School

in East Cleveland, and the city of Cleveland will receive bids October 8 for 200 tons for the Edgewater bath house. Local fabricating shops continue to get considerable small work and are filled up for the next few weeks. However, low prices are being quoted on fabricated work. Sheet mills are anxious for orders, and a further weakness in the sheet market has developed. Desirable black sheet orders have brought out prices as low as 2.05c. Pittsburgh, for No. 28, and galvanized sheets can be bought for immediate shipment at 3.10c., these prices being \$1 a ton lower than the previously quoted minimum prices. On blue annealed sheets 1.60c. for No. 10 appears to be firmly maintained as the minimum price. The demand for bar iron is not active and prices are unchanged at 1.40c. to 1.45c. The demand for light rails continues very good. The C. H. Fath & Son Construction Company, Cleveland, which is reported to be low bidder on the Lincoln Memorial to be built in Washington, D. C., has announced that if it is given the contract it will probably not use sheet steel piling. It has been estimated that the erection of this structure would require 3000 tons of piling. Warehouse business shows an improvement over the previous month. There is quite a heavy demand on warehouses for steel bars for reinforced concrete work. Warehouse prices are unchanged at 2c. for steel bars and 2.10c. for plates and structural material.

Old Material.—The market continues dull. Quotations stay about stationary, but prices are weak and carload sales are being made at price concessions. One dealer is offering \$11.25 for heavy melting steel, which is 50c. a ton more than one of the local mills has been offering. The Upson Steel Company has lifted its embargo on scrap, but has considerable material under contract and does not expect to be in the market for some time. We quote f.o.b. Cleveland as follows:

Per Gross Ton.	
Old steel rails, rerolling	\$13.00 to \$13.50
Old iron rails	14.00
Steel car axles	17.00 to 17.50
Heavy melting steel	11.00 to 11.25
Old carwheels	12.50 to 13.00
Relaying rails, 50 lb. and over	23.00 to 25.00
Agricultural malleable	10.00 to 10.50
Railroad malleable	11.00 to 11.50
Light bundled sheet scrap	7.50 to 8.00
Bundled tin scrap	11.00 to 11.50
Per Net Ton.	
Iron car axles	\$20.00 to \$21.00
Cast borings	5.75 to 6.00
Iron and steel turnings and drillings ..	4.50 to 4.75
Steel axle turnings	7.00 to 7.50
No. 1 busheling	10.25 to 10.50
No. 1 railroad wrought	10.50 to 11.00
No. 1 cast	11.00 to 11.50
Stove plate	8.50 to 8.75

British Steel Prices Reduced

More Blast Furnaces Going Out—Some Good Transactions in Steel Rails

(By Cable)

LONDON, ENGLAND, October 1, 1913.

It is impossible to confirm reported impending shipments of Cleveland pig iron to Philadelphia. People in the best position to know deny the reports categorically. More furnaces are going out, 17 having stopped since the end of May. Shipments from Middlesbrough are good; stocks are decreasing but there is no confidence. Steel prices are all reduced 10s. (\$2.43) for home trade and occasionally to a similar extent for export. Bolckow, Vaughan & Co. have booked 27,000 tons of rails and the Lithgow Works 17,000 tons for Australia. Germany has taken a small order for Japan. America has booked 300,000 boxes of tin plates for Canada in competition with Wales. Stocks of pig iron in Connal's stores are now 174,111 gross tons, against 175,705 tons a week ago. We quote as follows:

Tin plates, cokes, 14 x 20, 112 sheets, 108 lb. f.o.b. Wales, 13s. 1½d. (\$3.19).

(The following prices are per ton of 2240 lb.):

Cleveland pig-iron warrants (Tuesday), 54s. 4½d. (\$13.25), against 54s. 8d. (\$13.30) a week ago.

No. 3 Cleveland pig iron, makers' price f.o.b. Middlesbrough, 55s. (\$13.38), against 55s. 3d. (\$13.44) a week ago.

Ferromanganese, £9 17s. 3d. (\$48), against £10 11s. 9d. (\$51.53), f.o.b. shipping port last week.

Steel sheet bars (Welsh), delivered at works in Swansea Valley, £4 15s. (\$23.11).

Steel bars, export, f.o.b. Clyde, £6 10s. (\$31.63).
 Steel joists, 15-in., export f.o.b. Hull or Grimsby, £5 17s. 6d. (\$28.59), against £6 2s. 6d. (\$29.81) last week.
 Steel ship plates, Scotch, delivered local yards, £7 7s. 6d. (\$35.89), against £7 15s. (\$37.72) last week.
 Steel black sheets, No. 28, export f.o.b. Liverpool, £9 5s. (\$45.02).
 Steel rails, export, f.o.b. works port, £6 7s. 6d. (\$31.02), a decline of 2s. 6d. (61c.).
 (The following prices are per export ton of 1015 kilos, equivalent to 2237.669 lb.):
 German sheet bars, f.o.b. Antwerp, 87s. 6d. (\$21.29).
 German 2-in. billets, f.o.b. Antwerp, 80s. (\$19.46).
 German basic steel bars, f.o.b. Antwerp, £4 12s. (\$22.38), against £4 14s. (\$22.87) last week.
 German joists, f.o.b. Antwerp, £5 8s. to £5 11s. (\$26.28 to \$27.01).

(By Mail)

Pig Iron Market Weak and Halting—Lower Prices for Billets, Sheet Bars and Plates

LONDON, September 20, 1913.

There is not the smallest sign of a change for the better in the position of the iron and steel trade so far as this country is concerned. The long anticipated buying movement due for the autumn has entirely failed to mature, and the result has been a steadily growing feeling of dissatisfaction with the position at large, which has found expression in a lowering of prices in a number of directions. Speculative interest in Cleveland pig iron has been of the smallest. The position in the Cleveland district is not trusted, for one thing. The dealers regard the continual drain upon the stocks in warrant stores as being quite illusory, for they argue that makers, especially those to the forefront in the recent agitation to crush the warrant market, are accumulating stocks in their private yards, and the supposition receives more than a suspicion of color from what is going on. It is stated that Bolckow, Vaughan & Co., the largest pig iron producers in Cleveland, are blowing out furnaces this week, being unable to find an outlet for the product and having already a heavy stock on hand. How these people and the other Cleveland iron men are going to hold back their stocks from the market for any length of time remains to be seen. The material is readily salable as warrants, and it is not every one who can afford to let capital stand idle in this way. No doubt considerations of pride stand in the way of the due utilization of the public warehouses at this juncture, but the indulgence of this particular form of vanity costs money.

Weakness in German Finished Products

The weakest spot is still the Continent. Germany is bad, even though it may not be admitted. Works of the first rank there can give deliveries of all sorts of material against specifications in anything from a few days to two to three weeks, and they are all round very hard up for orders, which they will take at ever-drooping prices. I hear that ¼-in. German ship plates, with Lloyd's certificate thrown in, have been done at £5 10s. (\$26.75) f.o.b. Antwerp for Clyde shipbuilders, a ruinous figure for open hearth material, while without 107s. (\$26) to 108s. (\$26.25) is quoted, and of course basic material is to be bought for even less.

Joists are of the weak side, and there is very little business about. Prices of foreign joists have not been altered, and everything is being done to put the best face on things, stress being laid, for instance, on the big state orders for rails given out by the German authorities. These will no doubt keep works busy for several months, but it is greatly to be feared that once they are worked off difficulties may be experienced in finding full occupation for plant and workmen. The demand for semi-finished steel is not at all brisk and consumers are certainly looking for lower prices. Hematite iron has come down with a run, there being sellers of West Coast at 69s. (\$16.80) f.o.b., a drop of about 6s. in the month. East Coast has also come down and the Sheffield steel men have bought freely around 66s. (\$16.05) f.o.b.

There was a broad run of demand for galvanized sheets a short time ago, and makers covered their needs in raw material liberally, but it is much to be questioned if the demand for sheet bars from this quarter can develop any important proportions over the next couple of months. It rather looks just at the moment as if merchants had overbought themselves in galvanized sheets.

St. Louis

ST. LOUIS, Mo., September 29, 1913.

With prices firm for scrap material both buyers and sellers are waiting, the buyer in the hope of better figures and the seller disinclined to book orders at present prices over long-delivery periods. Consumption generally is keeping up and no deliveries are being ordered held up.

Pig Iron.—Sales reported are largely in carload and 50-ton lots, but there were no sales of more than 500 tons. There have been probably a half dozen of the latter. Altogether the aggregate tonnage for the week was about 6000 tons. There are few inquiries out at present, most being filled promptly; still outstanding is one for 200 tons of No. 1 Northern. The sales include a considerable number of small lots of Lake Superior charcoal iron and one of about 250 tons of No. 2 Northern. Prices are firmly quoted here by representatives at \$11.50, Birmingham basis, for No. 2 Southern foundry prompt, last quarter and first quarter, with \$12 for first half, though this latter is not urged. Chicago No. 2 X is quoted at \$15, and Ohio, Iron-ton basis, at \$14 to \$14.50.

Coke.—There has been a considerable number of inquiries for small lots running up to 200 tons. By-product coke is quiet on the Connellsville basis.

Finished Iron and Steel.—It is anticipated that September will show a considerable decrease in the unfilled tonnage as shipments have been moving freely forward the past four weeks, while the aggregate of new orders is not as large as it has been. Fabricating shops report themselves only fairly busy just now, though there is considerable new work in sight. Their yards are pretty well fixed for structural material supplies, though not in any abnormal quantities. Reinforcing bars are in better request now than expected, with the weather approaching times making for hesitancy in reinforced concrete work. Plates are weak with very little doing. There are no inquiries out for standard section steel rails, while the business in light rails is only moderate, the demand being principally from the coal interests. Track fastenings have been in light request.

Old Material.—The scrap market has not recovered from the large quantities dumped upon it and with a prospect for further large quantities as is customary about the first of the month, which is close at hand. No large lists are out, but a local industry is offering about 300 tons of miscellaneous scrap, while the Wabash railroad has about 200 tons for sale. Mills are taking material only as needed and are not even buying bargains offered. Re-rolling rails, which are in some better request, and relaying rails, which are still hard to get, are the only favorable spots apparent in the market. The quotations given are f.o.b. St. Louis dealers' prices, while delivered at the mills the figures would be an average of about 50 cents higher:

Per Gross Ton.

Old iron rails	\$11.00 to \$11.50
Old steel rails, re-rolling	11.50 to 12.00
Old steel rails, less than 3 feet	9.50 to 10.00
Relaying rails, standard section, subject to inspection	23.50 to 24.50
Old carwheels	10.50 to 11.00
Heavy melting steel scrap	9.25 to 9.75
Shoveling steel	8.50 to 9.00
Frogs, switches and guards cut apart	9.00 to 9.50

Per Net Ton.

Iron angle bars	\$10.50 to \$11.00
Steel angle bars	8.00 to 8.50
Iron car axles	18.00 to 18.50
Steel car axles	14.00 to 14.50
Wrought arch bars and transoms	12.00 to 12.50
No. 1 railroad wrought	9.25 to 9.75
No. 2 railroad wrought	8.50 to 9.00
Railroad springs	8.00 to 8.50
Steel couplers and knuckles	8.00 to 8.50
Locomotive tires, smooth	10.00 to 10.50
No. 1 dealers' forge	8.50 to 9.00
Mixed borings	4.00 to 4.50
No. 1 busheling	8.00 to 8.50
No. 1 boilers, cut to sheets and rings	5.00 to 5.50
No. 1 cast scrap	9.00 to 9.50
Stove plate and light cast scrap	7.00 to 7.50
Railroad malleable	8.00 to 8.50
Agricultural malleable	6.50 to 7.00
Pipes and flues	6.00 to 6.50
Railroad sheet and tank scrap	5.00 to 5.50
Railroad grate bars	6.50 to 7.00
Machine shop turnings	4.50 to 5.00
Bundled sheet scrap	4.00 to 4.50

The Joseph Joseph & Bros. Company, with offices here, in Cincinnati, Chicago and other cities, is completing arrangements for opening a large yard at St. Louis, which is to be equipped with facilities for handling scrap material in all forms and with modern machinery to handle and manufacture material, putting

into shape for delivery at the mills the large volume of miscellaneous scrap which the company purchases from the railroads in this territory. A number of sites are under consideration and the definite location will probably be shortly settled.

Pittsburgh

PITTSBURGH, PA., October 1, 1913.

Hardly enough new business is being placed to test prices. It is evident that consumers are looking for lower prices and are not buying a pound more of anything than is absolutely necessary. The passage of the tariff bill this week is eagerly awaited by the trade, as it will at least remove the uncertainty that has been hanging over the market for so many months. There is a little more inquiry for pig iron, and some fair-sized sales have been made of both foundry and mill iron at prices that have been ruling for some time. With little new inquiry for billets or sheet bars, there are reports of offerings by the smaller mills at considerably lower prices than the larger mills quote. Probably the strongest item on the whole list is steel bars, the new demand for which is good. Plates, sheets and other finished products are dull, with prices seeking a lower level. No. 28 black sheets have been sold at 2.05c., at mill. A reduction in steel pipe is looked for by the trade some time prior to October 15. There has been a serious break in the local scrap market, and prices on some grades have declined 50c. to 75c. a ton. Coke is dull, and best grades of furnace coke are freely offered at \$2.25 per net ton or less at oven. It is not believed that the reduction in the price of ferromanganese will increase the demand. The whole market is in a waiting attitude and this condition is likely to continue for some time.

Pig Iron.—There has been more new inquiry in the past week than for some time, but sales so far have been only in small lots and for prompt delivery to meet current needs. A local interest reports a sale of 1000 tons of basic iron for last quarter delivery at \$14.25, Valley furnace. We also note a sale of 1500 tons of Northern forge iron to a pipe mill for last quarter delivery at \$13.50, Valley furnace, and the market is strong at this figure. The Standard Sanitary Mfg. Company is in the market for 3000 tons or more of No. 2 foundry iron and 500 tons of No. 3. It bought about 500 tons of No. 2 iron which it needed promptly on the basis of about \$14, or slightly under, at Valley furnace. Hall furnace of the Republic Iron & Steel Company at Sharon, Pa., went out of blast on Monday, September 29. We quote: Bessemer, \$15.75; basic, \$14 to \$14.25; No. 2 foundry, \$14 to \$14.25; malleable Bessemer, \$14.25 to \$14.50, and gray forge \$13.50, all at Valley furnace, the freight rate for delivery in the Pittsburgh or Cleveland district being 90c. a ton.

Billets and Sheet Bars.—Offerings by the smaller outside mills are heavier, and it is said they are quoting prices on open-hearth stock considerably lower than the larger mills are naming. The Carnegie Steel Company is still short of open-hearth steel, and is operating all its steel plants to full capacity. Reports that its Mingo Junction steel works are closed down are untrue. The sheet bar mill at this plant is off to allow a new engine to be installed, but the blooming mill is running and the steel is being sold in the form of billets. While we do not quote open-hearth billets below \$24 and sheet bars under \$25, it is said that open-hearth steel is being offered by small mills at less prices. We quote open-hearth and Bessemer billets for prompt delivery, and also for shipment over remainder of the year, at \$24, and Bessemer or open-hearth sheet bars for the same delivery at \$25, makers' mills, in the Pittsburgh or Youngstown districts. No higher prices are asked now for Bessemer steel than for open-hearth. We quote forging billets \$30 to \$31 and axle billets \$26 to \$27, maker's mill.

Steel Rails.—It is expected that some heavy contracts for steel rails for 1914 delivery will be placed during October. Reports that the Carnegie Steel Company had just taken 3000 tons for Lehigh Valley are untrue, as this order was placed about three months ago. There is a fair demand for standard sections in small orders which aggregate a moderate tonnage. The new demand for light rails is rather active, but the rerolling rail mills are still cutting prices on rails rolled from billets \$2 or more per ton. The Carnegie Steel Company received new orders and specifications in the past week for about 2100 tons of light rails. We quote splice bars at 1.50c. per lb. and standard section rails at 1.25c. per lb. Light rails are quoted as follows: 25, 30, 35, 40 and 45 lb.

sections, 1.25c.; 16 and 20 lb., 1.30c.; 12 and 14 lb., 1.35c., and 8 and 10 lb., 1.40c., all in carload lots, f.o.b. Pittsburgh.

Muck Bar.—This week the A. M. Byers Company, Girard, Ohio, and the Youngstown Sheet & Tube Company, Youngstown, Ohio, expect to start their muck bar mills as open mills, and will pay the same rate for boiling as called for in the Amalgamated Association scale. There is a scarcity of high-grade muck bar made from all pig iron, and it is said that as high as \$33 has been offered for it but refused. Eastern makes of muck bar are being offered at \$28 at maker's mill, equal to \$30.40 delivered, Pittsburgh.

Plates.—The local plate market is in an unsatisfactory condition, the new demand being dull, and prices are weak. It is said that some of the smaller mills have sold plates at 1.35c., Pittsburgh, but the larger mills are still quoting 1.40c. to 1.45c. Several of the smaller concerns have their mills down at present for lack of orders. Steel car orders in the past week have been light, and the only active inquiry in the market is one from the Chicago & Northwestern for 2500 steel gondolas. We continue to quote ¼-in. and heavier tank plates at 1.40c. to 1.45c.

Structural Material.—New inquiry has been fairly active, but only a moderate amount of work has been placed. The Jones & Laughlin Steel Company has taken 300 tons for a steel building, and the McClintic-Marshall Construction Company 1000 tons for a steel viaduct for the Montour Railroad at McDonald, Pa., and 200 tons for a street bridge at Philadelphia. The contract for the new Masonic Temple building in this city has been awarded to a local company, but the contract for the steel, about 3000 tons, has not yet been placed. We quote beams and channels up to 15 in. at 1.40c. to 1.45c., Pittsburgh.

Wire Rods.—The new demand is fairly active, but only for small lots. We note sales of Bessemer and open-hearth rods, probably 500 to 600 tons, at \$27.50 or less at maker's mill. We quote Bessemer, open-hearth and chain rods at \$27 to \$27.50, Pittsburgh.

Ferroalloys.—A reduction of \$3.50 a ton has been made in the price of foreign ferromanganese, or from \$56 to \$52.50, seaboard. Prior to this reduction there was a fair amount of new inquiry, and sales of carloads and up to 100 tons were being made at \$55 to \$56, Baltimore. Local dealers do not believe the reduction will stimulate the demand as ferromanganese is now to be on the free list. We quote 80 per cent. foreign ferromanganese at \$52.50, Baltimore, the freight rate to the Pittsburgh district being \$2.16 a ton. We quote 50 per cent. ferrosilicon, in lots up to 100 tons, at \$75; over 100 tons to 60 tons, \$74; over 600 tons, \$73, Pittsburgh. We quote 10 per cent. ferrosilicon at \$22; 11 per cent., \$23, and 12 per cent. \$24, f.o.b. cars Jackson County, Ohio, or Ashland, Ky., furnaces. We quote 20 per cent. spiegel-eisen at \$25 at furnace. We quote ferrotitanium at 8c. per lb. in carloads; 10c. in 2000-lb. lots and over, and 12c. in lots up to 2000 lb.

Skelp.—The market is firm and the mills rolling skelp are pretty well filled with orders for the remainder of the year. Youngstown mills are quoting grooved steel skelp at 1.35c. at mill, which is equal to 1.40c., Pittsburgh. There is still a scarcity of iron skelp and some mills are quoting higher prices. We quote grooved steel skelp at 1.35c. to 1.40c.; sheared steel skelp, 1.40c. to 1.45c.; grooved iron skelp, 1.60c. to 1.65c., and sheared iron skelp, 1.65c. to 1.70c., delivered to buyers' mills in Pittsburgh district.

Iron and Steel Bars.—New demand for steel bars is keeping up remarkably well, and from the railroads is quite heavy. Mills report that specifications are excellent, and the situation in steel bars, both as regards maintenance of price and new orders and specifications, is more satisfactory than on any of the other finished lines. The Jones & Laughlin Steel Company has taken 2400 tons of bars for concrete work for delivery at Portland, Ore. The new demand for iron bars is not so active, but owing to the fact that four or five of the puddling mills have been shut down since July 1 prices are firmer. We quote steel bars for forward delivery at 1.40c. and for shipment from warehouse in small lots at 1.90c. We quote iron bars at 1.55c. to 1.65c. The mills charge \$1 extra per ton for twisting ¾-in. and larger steel bars and \$2 extra for ½ to ¾ in. In some cases, however, these extras are being shaded.

Sheets.—New buying in sheets in the past week is reported by several mills to have been more active, but prices are unsatisfactory and are showing a strong tendency to seek a lower level. Some of the larger makers of sheets are now very much averse to making contracts

with heavy consumers, for the reason that some buyers have not been taking sheets on contracts closed some time ago but have been buying from other mills at lower prices. It is said the margin in sheets at present is less than when the low point was reached in 1911, which was about 1.85c. for No. 28. At that time sheet bars were about \$19, but at present they are about \$25, or \$6 a ton higher, while to-day the price of No. 28 black sheets is only about \$4 a ton higher than the low point of two years ago. While No. 28 Bessemer black sheets have sold as low as 2.05c. several mills state they are getting 2.10c. to 2.15c. right along and have not yet had to meet the low figure. The American Sheet & Tin Plate Company is operating 75 per cent. of its hot sheet mill capacity, while some of the other makers are running to a higher rate and others at a lower. We quote Nos. 9 and 10 blue annealed sheets at 1.60c. to 1.65c.; No. 28 Bessemer black, 2.05c. to 2.15c.; No. 28 galvanized, 3.10c. to 3.20c.; No. 28 tin mill black plate, 2.15c. to 2.20c., and No. 30, 2.20c. to 2.25c. These prices are f.o.b. Pittsburgh, in carload and larger lots, jobbers charging the usual advances for small lots from store.

Tin Plate.—There is some buying of tin plate in small lots to cover current needs, and most of this business is being placed at \$3.50 and in some cases at \$3.60 per base box. Specifications from the can makers were cleaned up three or four weeks ago, and the amount of business is lighter than some months ago and will likely get less. Operations among the tin plate mills are being restricted considerably, and at present the American Sheet & Tin Plate Company is operating to about only 75 per cent. of capacity. On the small amount of new business that is being placed, we quote 100 lb. cokes at \$3.50 to \$3.60 and 100 lb. ternes at \$3.35 to \$3.45, f.o.b. Pittsburgh.

Spikes.—The new demand is reported a little better, but is still only for small lots to cover current needs. None of the railroads is in the market with large inquiries and the spike trade is quiet, with none of the makers running to full capacity. We quote railroad spikes in base sizes, $5\frac{1}{2} \times 9/16$ in., at \$1.65 to \$1.70, and small railroad and boat spikes in carload and larger lots at \$1.75 to \$1.80 per 100 lb., f.o.b. Pittsburgh.

Bolts and Rivets.—A fair amount of new business is being placed in nuts and bolts, but consumers are still buying from hand to mouth, not desiring to anticipate future requirements. The tone of the market is firm, and it is said there is less cutting in prices than for some time. The new demand for rivets is only fair, consumers buying only in small lots to cover current needs. We quote button-head structural rivets at \$1.90 in large lots and \$2 in small lots, and cone-head boiler rivets at \$2 in large lots and \$2.10 in small lots, terms 30 days net, less 2 per cent. for cash in 10 days. Regular discounts on nuts and bolts are as follows in lots of 300 lb. or over, delivered within a 20c. freight radius of maker's works:

Coach and lag screws	.....80 and 10% off
Small carriage bolts, cut threads	.....75 and 5% off
Small carriage bolts, rolled threads	.....75 and 10% off
Large carriage bolts, cut threads	.....70 and 2% off
Small machine bolts, cut threads	.....75 and 10% off
Small machine bolts, rolled threads	.....75, 10 and 5% off
Large machine bolts	.....70 and 7½% off
Machine bolts with C.P.C. and T nuts, small	75 and 5% off
Machine bolts with C.P.C. and T nuts, large	.....70% off
Square hot pressed nuts, blanked and tapped	.....\$5.70 off list
Hexagon nuts	.....\$6.30 off list
C.P.C. and R. square nuts, tapped and blank	.....\$5.70 off list
Hexagon nuts, ¾ and larger	.....\$6.60 off list
Hexagon nuts, smaller than 9/16	.....\$7.20 off list
C.P. plain square nuts	.....\$5.20 off list
C.P. plain hexagon nuts	.....\$5.50 off list
Semi-finished hexagon nuts, ¾ and larger	.....85% off
Semi-finished hex. nuts, smaller than 9/16	85 and 10% off
Rivets, 7/16 x 6½, smaller and shorter	75, 10 and 10% off
Rivets, metallic tinned, bulk	.....3½c. per lb. net extra
Rivets, tin plated, bulk	.....1½c. per lb. net extra
Rivets, metallic tinned, packages	.....70, 10 and 10% off
Standard cap screws	.....75, 10, 10 and 7½% off
Standard set screws	.....75, 10, 10 and 7½% off

Shafting.—There is no betterment in the new demand for shafting, which is still confined to small lots to cover current needs. Large consumers are not specifying against their contracts placed some time ago, and it is said the new business placed at present represents only 35 per cent. or less of capacity. We quote cold-rolled shafting at 60 per cent. off in carloads and 55 per cent. in small lots delivered in base territory, but on any desirable business 62 per cent. off is being named.

Hoops and Bands.—Most consumers are covered for some time ahead, and are specifying at a fair rate; but new demand is dull and only for very small lots. We quote bands at 1.40c. with extras as per the steel bar card, and steel hoops at 1.60c., Pittsburgh. It is said

this price on steel hoops is being firmly held and the market is strong.

Wire Products.—Most of the large buyers of wire and wire nails have placed contracts for their requirements for some time ahead and new business being placed is light and only for small lots. Several wire-nail mills report specifications as coming in quite freely, and a good volume of business is looked for over the next two or three months. Retailers are also placing orders more freely with jobbers. It is said that regular prices on wire nails and wire are now quite firmly held, and that all cutting has disappeared. We quote: Wire nails to jobbers, \$1.65; cut nails, \$1.60; plain annealed wire, \$1.45; galvanized barb wire, \$2.05, and painted barb wire, \$1.65, f.o.b. Pittsburgh, per 100 lb., usual terms, actual freight added to point of delivery.

Merchant Steel.—New demand is still confined to small lots to cover current needs and specifications against contracts for some time have been only fair. The volume of new business in September is reported by the mills to have been about the same as in August. Prices, which are being more or less shaded, depending on the order, are as follows: Iron finished tire, $1\frac{1}{2} \times \frac{1}{2}$ in., and larger, 1.40c., base; under $1\frac{1}{2} \times \frac{1}{2}$ in., 1.55c.; planished tire, 1.60c.; channel tire, $\frac{3}{4}$ to $\frac{7}{8}$ and 1 in., 1.90c. to 2c.; $1\frac{1}{8}$ in. and larger, 2c.; toe calk, 2c. to 2.10c., base; flat sleigh shoe, 1.75c.; concave and convex, 1.80c.; cutter shoe, tapered or bent, 2.30c. to 2.40c.; spring steel, 2c. to 2.10c.; machinery steel, smooth finish, 1.85c. We quote cold-rolled strip steel as follows: Base rates for 1 in. and $1\frac{1}{2}$ in. and wider, under 0.20 carbon, and No. 10 and heavier, hard temper, 3.30c.; soft, 3.55c.; coils, hard, 3.20c.; soft, 3.45c.; freight allowed. The usual differentials apply for lighter gauges and sizes.

Standard Pipe.—Jobbers are anticipating a readjustment in prices of steel pipe to a lower basis between now and October 15. Several of the larger pipe mills report that actual orders for lap weld and line pipe entered in September were heavier than in August. Spang, Chalfant & Co. have taken a contract for 10 miles of 16-in. line pipe and the Texas Company is in the market for 40 miles of 6-in. and 10 miles of 3 to 4-in. pipe. This business will likely go to a Youngstown mill. The new demand for oil country goods continues heavy, and is taxing the mills to the utmost to meet it. Discounts on iron and steel pipe are fairly well maintained, but on iron pipe are strong, due to the scarcity of muck bar.

Boiler Tubes.—New demand for locomotive and merchant tubes is reported slightly better in the past week, and some good-sized orders have been placed. Competition among the mills making boiler tubes is still quite keen and discounts are being shaded.

Coke.—The coke market is quiet, and best brands of furnace coke are readily obtainable at \$2.25 or less per net ton at oven. A sale is reported of 5000 tons and another of 6000 tons of standard furnace coke for October delivery at about \$2.25 at oven. Some grades of furnace coke that are not regarded as strictly standard can be had at \$2.10 to \$2.15 at oven. Attempts of some coke makers to get \$2.50 have about been given up, as a full supply to meet current demands can be had at lower figures. There is a fair inquiry for foundry coke and best grades are ruling firm at \$2.90 to \$3 at oven. We quote standard makes of furnace coke for delivery over the remainder of the year at \$2.15 to \$2.25, but note that several large makers are firm at \$2.50 per net ton at oven. We quote best grades of 72-hr. foundry coke at \$2.90 to \$3 per net ton at oven.

Old Material.—A serious break in prices of scrap has taken place in the past week, due to heavy offerings of material in this district from both Eastern and Western markets. Some grades of scrap have gone off about 50c. a ton and the whole market is weak. There has been a serious decline in rerolling rails which have sold below \$13.75 at an important consuming point. Prices on borings are firm and they continue scarce. We note sales of selected heavy steel scrap involving about 5000 tons at about \$12.50 to a consuming point outside of the Pittsburgh district. Also about 2000 tons of turnings at \$7.25 to \$7.50 delivered. It is said the supply of scrap is three or four times as heavy as the demand, and the whole market is in very unsatisfactory condition. Bids on the scrap lists of the Pennsylvania and Baltimore & Ohio railroads are to be opened on Thursday, October 2, and prices offered by dealers are considerably lower than on previous lists. We have reduced prices on selected and ordinary heavy steel scrap, also on rerolling rails

and bundled sheet scrap. Dealers are now quoting as follows, per gross ton, for delivery in the Pittsburgh district:

Selected heavy steel scrap, Steubenville, Follansbee, Brackenridge, Sharon, Monessen, Midland and Pittsburgh delivery....	\$12.25 to \$12.50
Ordinary steel scrap	12.00 to 12.25
Compressed side and end sheet scrap.....	10.50
No. 1 foundry cast	12.75 to 13.00
No. 2 foundry cast	11.50 to 11.75
Bundled sheet scrap, f.o.b. consumers' mills, Pittsburgh district	7.25 to 7.50
Rolling rails, Newark and Cambridge, Ohio, Cumberland, Md., and Franklin, Pa.....	13.75
No. 1 railroad malleable stock.....	11.50 to 11.75
Grate bars	8.25 to 8.50
Low phosphorus melting stock	15.75 to 16.00
Iron car axles	24.50 to 25.00
Steel car axles	17.50 to 17.75
Locomotive axles, steel	21.00 to 21.50
Locomotive axles, iron	25.50 to 26.00
No. 1 busheling scrap	12.00 to 12.25
No. 2 busheling scrap	7.50 to 7.75
Machine shop turnings	7.25 to 7.50
Old car wheels	13.75 to 14.00
Cast-iron borings	8.25 to 8.50
Sheet bar crop ends	14.00 to 14.25
Old iron rails	14.50 to 14.75
No. 1 railroad wrought scrap	13.75 to 14.00
Heavy steel axle turnings	9.00 to 9.25
Stove plate	8.25 to 8.50

*These prices are f.o.b. cars at consumers' mills in the Pittsburgh district.
 †Shipping point.

German Conditions Still Bad

Rail Business Exceptionally Good—Reductions in Shapes and Semi-Finished Steel

BERLIN, September 18, 1913.

The most important event of the week has been the reduction in prices of semi-finished steel and structural shapes by 5 marks (\$1.19) a ton, which was voted by the Steel Works Union yesterday. These reductions are greater than the market had ventured to expect. Of course there was much pressure for lower prices for semi-finished steel, but as a reduction had been made in June for the current quarter it was doubted whether another would be made for the fourth quarter. It had not been expected that the reduction on structural shapes would be more than 2.50 marks (59c.). The price was raised by that amount at the beginning of this year, and it was believed that the Union would begin to lower prices by merely removing that advance. The new prices for semi-finished steel are as follows: Ingots, 82.50 marks (\$19.63); blooms, 87.50 marks (\$20.82); billets, 95 marks (\$22.61), and slabs, 97.50 marks (\$23.20). The new prices of structural shapes range between 117.50 and 120 marks (\$27.97 to \$28.56).

The Steel Syndicate's Report

At the meeting of the Steel Works Union a survey of the market was given out, of which the following is a summary. In semi-finished products the market is still feeling the effects of the political unrest of the past year; there is not yet enough confidence among buyers to cause a marked revival of business. In heavy rails the bookings have been further increased by the regular orders from the Bavarian railroads, which were about 25 per cent. above previous orders. In the foreign section of the rail market scarcely any change has occurred, beyond slightly increased hesitancy in placing orders. Grooved rails are still in a satisfactory position, and a number of orders have been taken from both home and foreign sources, but foreign competition is growing sharper. Structural shapes continue sluggish, as previously. Business with the Balkan countries has begun to pick up.

Market reports continue, for the most part, unsatisfactory. It is represented that the autumn business, which usually sets in briskly by this time, has so far shown no signs of animation. Both consumers and dealers show little disposition to place large orders for long periods, and there is sharp competition to obtain such small orders as are appearing in the open market. Reports of reduced working hours, which were at first confined to the smaller rolling mills, now include even the great mixed works of the Union. It is reported that orders have sharply fallen off within a week. On the other hand, one of the reviews claims that the export market shows some improvement of late; that buying is somewhat more active, and that there is even a disposition to make long contracts.

In the ore market heavier offering of minettes at somewhat easier prices is mentioned. On the other

hand, it is reported from the upper Silesian district that calls for ores on order are very heavy, and that higher prices had to be paid in some cases on new orders. Russian and Swedish ores remain firm. Manganese ores have begun to arrive more freely from the Black Sea; but freight rates remain high, and the cost of these ores at German furnaces is still at high-water mark.

The Pig-Iron Situation

The position of pig iron remains fairly satisfactory, but it is evidently weakening somewhat. The shipments in August by the Syndicate are now given at somewhat below 90 per cent. of allotments; the July shipments stood at 92 per cent. Several months ago, as will be recalled, shipments exceeded allotments 2 to 5 per cent. From the Silesian district it is mentioned that iron is still going into consumption as fast as it runs from the furnaces, and that these are not fully able to supply the demand. Prices have been fully maintained there, and in a few special grades even a slight rise is claimed to have occurred. The question of the hour is whether the Syndicate, at a meeting to be held on the last day of the month, will vote to make a reduction of prices. It is expected that a small cut will be adopted on steel-making grades, and that a general cut will probably be voted, dependent upon a reduction of coke by the Coal Syndicate before the end of the year. The market for scrap continues weak, as the open-hearth steel plants are exerting special pressure to buy their supplies at lower prices. The amount of material coming on the market continues pretty heavy.

As to steel bars, reports are rather conflicting. In the matter of prices, for example, one review quotes 98 to 102 marks (\$23.32 to \$24.28) as the usual prices, with a discount; while specially rolled open-hearth bars are represented as costing 110 marks (\$26.18). Other reports, however, say that bars can be bought in some cases at less than 95 marks (\$22.61), but that works having a pretty large stock of orders in hand demand 97 to 98 marks (\$23.09 to \$23.32). Export prices are given at 94 to 95 marks (\$22.37 to \$22.61), f.o.b. Antwerp.

On heavy plates prices are variously mentioned as ranging between 106 and 110 marks (\$25.23 to \$26.18). It is hoped that the demand from the German shipyards will improve, now that the strike of workmen at the yards has at last been fully closed up. (It was declared off in August, but many of the men stayed out.) The competition from the big works outside of the Kontor continues keen, and the general position of this section of the market has visibly grown worse for several weeks.

From the Belgian trade it is reported this week that buying has again grown lighter, consumers holding back for better terms. Vienna dispatches state that the Iron Kartel is meeting to-morrow for the purpose of making a number of price reductions. It is expected that beams, plates and bars will be reduced.

Birmingham

BIRMINGHAM, ALA., September 30, 1913.

Pig Iron.—There has been further pig iron selling for the remainder of the year at \$11.50, with some of it probably lapping into 1914 at the 1913 figure; but little 1914 business worth mentioning is authentically reported. Sellers, including brokers, mention the receipt during the past week of numerous orders for small lots at \$11.50 without prior inquiry for quotations. One conservative iron manufacturer said: "I regard it as strictly a \$11.50 market for what is going. The furnace interests and the consumers are well sold and well bought up, respectively, for the remainder of the year. Some buyers claim they can get iron at less than \$11.50, but I do not believe they can." The quotation of \$12 is being made for 1914 business without bookings. Gray forge is among the lower grades that are scarce and is selling on a level with No. 4 foundry. One lot of 1000 tons of forge was sold at \$10.75 to a consumer who also purchased No. 2 foundry at the same time at \$11.50. Sales into Chicago territory are mentioned. One large furnace reports the sale of its current make. The Alabama Company is holding the make of its Ironaton furnace. Clifton iron, at \$12.50 to \$13, and is not booking over three months ahead. This company is contemplating resumption of operations at the Gadsden plant, if conditions continue good, an adequate ore supply having been obtained. Small lots of charcoal iron have brought from \$24.50 to \$25. We quote per gross

ton f.o.b. Birmingham district furnaces (the first figure being prices obtained for 1913 business regularly and the latter obtained in some instances) as follows:

No. 1 foundry and soft.....	\$12.00 to \$12.50
No. 2 foundry and soft.....	11.50 to 11.75
No. 3 foundry.....	11.00 to 11.25
No. 4 foundry.....	10.75 to 11.00
Gray forge.....	10.50 to 10.75
Basic.....	11.50 to 11.75
Charcoal.....	24.50 to 25.00

Coal and Coke.—The coal market has been a trifle quieter, but movements are still heavy, with practically all collieries operating and prices maintained. The output of 1913 will far surpass any record. Cars sufficient to move output are obtainable in most instances, due to superior service. Coke is strong at the ruling figures. There is practically no furnace coke to be had. It is quoted at \$3 to \$3.50, and foundry at \$3.75 to \$4.25 per net ton at ovens.

Cast-Iron Pipe.—Pipe makers fail to report any special improvement and have not enlarged operations. They are credited, however, with having purchased a large amount of iron for future use at less than present prices and have put themselves in good position for a return of active conditions. One maker is said to have secured 20,000 tons at \$10.75 a few weeks ago. We quote f.o.b. yards as follows: 4-in., \$22; 6-in., \$20, with \$1 added for gas pipe.

Old Material.—Old material men report a number of small deals in a variety of scrap during the week and better inquiry, but the volume of business was not as great as in the preceding two weeks. A few price changes have been made. We quote per gross ton f.o.b. dealers' yards, as per revised schedule, the following:

Old iron axles (light).....	\$15.00 to \$15.50
Old steel axles (light).....	15.00 to 15.50
Old iron rails.....	12.50 to 13.50
No. 1 railroad wrought.....	12.00 to 12.50
No. 2 railroad wrought.....	10.00 to 10.50
No. 1 country wrought.....	9.50 to 10.00
No. 2 country wrought.....	8.50 to 9.00
No. 1 machinery cast.....	10.00 to 10.50
No. 1 steel scrap.....	10.50 to 11.00
Tram carwheels.....	10.50 to 11.00
Standard carwheels.....	12.00 to 12.50
Light cast and stove plate.....	8.25 to 8.75

San Francisco

SAN FRANCISCO, CAL., September 25, 1913.

The general consuming demand for steel products is keeping up extremely well. While as yet there has been no marked increase merchants look for a month or two of marked activity before the end of the year. A few single inquiries of some importance are also noted, and financial conditions are better than for some months. Buying for stock, however, is, if possible, on a smaller scale than before. Practically nothing is being ordered in advance of requirements. The shortage in some of the heavier lines is being met by frequent small purchases from the local stock of the United States Steel Products Company, while other lines available for prompt delivery are ordered by wire in single carloads.

Bars.—Little important business in reinforcing material is coming out, but the tonnage booked in small orders continues satisfactory and values are fairly well maintained. Resale business in soft steel bars is about normal for this season, with a fair tonnage going to the larger manufacturers, and stocks of imported material have been considerably reduced. Merchants, however, are buying practically nothing for shipment from the mills, as they are still able to fill in broken lines from stocks on this coast and are unwilling to carry any more than is absolutely needed. Small lots of steel bars from store are quoted as before at 2.50c., and iron bars at 2.40c.

Structural Material.—New contracts of importance are scarce, but there is a fair amount of business in sight, with prospects of considerable activity on small buildings. The largest contract reported is the Pacific Telephone & Telegraph building at Los Angeles, taken by the Baker Iron Works, while the Central Iron Works will furnish steel for the Y. M. I. building, this city, and the Mortenson Construction Company has a small boat house job in Oakland. The Hobart building and the Horticultural building are still undecided and nothing further has been heard of the Physicians' building. It is reported that the Santa Fé Railroad will build a steel viaduct at Richmond, Cal., and that the Western Pacific will soon replace some of its wooden

bridges with steel. The city of Sacramento has granted permission for the construction of a 20-story building, but fabricators do not take this seriously.

Rails.—Business continues quiet in both light and standard sections. Some progress is reported toward financing one or two new projects, but they are not yet in the market, and the established roads are keeping their purchases as low as possible. Indications are favorable for the construction of new logging roads in the spring, but little business from such sources is expected this year.

Sheets.—Galvanized sheets, especially in corrugating sizes, are receiving considerable attention at present and an active consuming demand is expected through October. In view of recent conditions in the primary market, however, merchants are buying only in single carloads, wiring their orders to mills that can make immediate shipment. There is considerable complaint of loss of profits through decline of prices on sheets in transit. Mill agents look for no further decline, but the trade is waiting for more tangible signs of firmness. There is a fair consuming demand for black and blue annealed sheets, but buying is for current needs only.

Plates.—An inquiry is reported for 2700 tons for the Los Angeles aqueduct, to be delivered at the rate of 50 tons per week. The tonnage taken on old contracts by tank and pipe manufacturers keeps up well and numerous oil-tank inquiries are coming out. Local jobbing trade is fair, but practically nothing is being purchased for stock.

Standard Pipe.—With deliveries unusually prompt on butt-weld sizes, assortments are being kept up by frequent small orders. Distributing firms report a good business, but even in the aggregate the tonnage taken by mill agents is not satisfactory. There is some talk of lower prices, but nothing definite has been announced along this line. The oil-well supply business is of only moderate proportions, and while there are rumors of important oil-line projects there are no definite inquiries in the market.

Cast-Iron Pipe.—The volume of inquiry has increased somewhat and there is said to be more tonnage in sight for the future than for some time, with decidedly favorable indications for the coming year. Values have advanced \$1 per ton, being quoted at \$33 for 6-in. and over and \$35 for 4-in. per net ton at Pacific coast terminal points. The town of Aberdeen, Wash., has taken alternate bids on cast-iron and steel pipe amounting to 400 tons in 16 and 20 in. sizes. Hillyard, Wash., takes bids this week on 1300 tons, and Pendleton, Ore., has ordered 140 tons. Pasadena, Cal., is in the market for 350 tons and Perris has decided on cast-iron pipe for its water system. Daly City will take bids September 29 for 150 tons. The town of Long Beach has voted \$200,000 bonds for further waterworks improvements. Corporation business is light.

Pig Iron.—With the arrival of several lots of foreign iron the local market is becoming more interesting, though the buying movement shows little increase. The arrivals include 1100 tons of Hanyang (Chinese), some of which is reported sold at a premium over domestic quotations, this iron being very strong and favored for certain uses. It is announced, however, that the Hanyang furnaces will be unable to ship any additional tonnage of importance to this market for some time. Some Indian iron has also arrived recently, finding a fair sale at about \$26. Mitsui & Co., agents for the Tata furnace (India), now have the agency for America and anticipate a good business, as the removal of the tariff will place this iron about on a level with Southern. The latter receives little attention at present and is quoted as before at \$22.50 per gross ton for No. 1 foundry and soft. Jarrow is a little easier, being offered from store at about the same price as Southern.

Coke.—Several shipments of German Syndicate coke have arrived recently, and most of the foundries are well supplied, current consumption being moderate. There is accordingly little buying at present. Prices for current loading are firm, as last quoted, at \$13.50 to \$14 per gross ton. German Syndicate coke, ex yard, is offered at \$15 to \$15.50 per net ton.

Old Material.—The scrap market is quiet, and values in some lines are lower, but the absence of heavy offerings prevents any marked weakness at the present quotations. Steel melting scrap is moving off steadily for current requirements at \$12 per gross ton. The foundry demand for cast-iron scrap is hardly as strong as it has been; while desirable material is scarce, ordinary offerings are sold at \$17 to \$18 per net ton. Re-rolling rails have also dropped a little, being quoted at \$15 to \$16 per net ton. Wrought scrap stands as before at \$13 to \$15 per net ton.

New York

NEW YORK, October 1, 1913.

Pig Iron.—Small space is required to cover the local pig-iron market of the past week. In general it is quieter and the run of sales is of the same order that has prevailed for some time, no buyer being in the market for any considerable quantity. Comparatively little iron has been bought by foundries for 1914 delivery, but there is in many cases an urgency about shipments which indicates that pig-iron stocks in foundry yards are small. Doubtless some of the requests that are coming to the furnaces for shipment in excess of contract stipulations are with a view to accumulating some iron against winter weather with its inevitable railroad interruptions. Under existing conditions prices are naturally steady. In fact, there has been no change worthy of note in the past three weeks. The pig iron required for the Corona, L. I., sewer castings contract, let last week to a Catasauqua, Pa., company, was covered in negotiations concluded some time ago. The segments just awarded amount to about 10,000 tons. We quote Northern iron for tidewater delivery as follows: No. 1 foundry, \$16 to \$16.25; No. 2 X, \$15.75 to \$16; No. 2 plain, \$15.50 to \$15.75. Southern iron is quoted at \$15.75 to \$16.25 for No. 1 foundry and \$15.25 to \$15.75 for No. 2.

Finished Iron and Steel.—Inquiries have fallen off sharply and in practically all lines both buyer and seller are awaiting developments. So far there are no evidences that foreign steel producers are trying out the market to any extent as the result of the tariff changes, but one or two cases are noted of domestic buyers offering to purchase at marked reductions under the general levels, without any result whatever. In view of the lack of interest, sellers apparently see no reason for shading prices, and no business has been learned as going for less than 1.40c., base, Pittsburgh, save to the very large buyers. In the structural field one new project of size has appeared, involving 5000 tons for a warehouse for the Austin Nichols & Co., wholesale grocers, and 500 tons for a pier shed in Baltimore and 400 tons for a warehouse in that city are also among the new offerings, while a moderate tonnage has been closed. Levering & Garrigues Company has taken 300 tons for a warehouse on West Twenty-eighth street and the Dominion Bridge & Iron Works, 600 tons for a telephone building, Montreal. It is reported that the American Bridge Company has the contract for the Philadelphia & Reading grade changes, Philadelphia, involving 750 tons. In plates the only large business learned of covers 500 tons, included in a structural steel project about to be closed. Some plate mills are occasionally shutting down a day now and then. In steel bars it appears that the Stone & Webster Corporation did not get less than 1.40c., bid for the 5000 tons of reinforcing bars and has not placed the contract because it is believed that lower quotations will later be obtainable. In the railroad car field there is no great encouragement, the presidents of two trunk lines now claiming that there will be no demand for cars in excess of their present serviceable rolling stock. It is doubtful if there are much more than 3500 freight cars in the market and of this number about two-thirds is the inquiry of one road. It is interesting to note, however, that the recent purchase of passenger equipment by the New York Central totaled no less than 420, requiring about 7000 tons of steel, and there are about 500 passenger cars still in the market, including 102 for the Northern Pacific, 16 for the Pennsylvania and 10 postal cars each for the Chicago, Burlington & Quincy and the Great Northern. The Brooklyn Rapid Transit is inquiring for 500 cars, 100 for delivery in 1913 and 100 every year thereafter. The distribution of the New York Central business is: American Car & Foundry, 129; Standard Steel Car Company, 116; Pressed Steel Car Company, 96; Pullman Company, 59. The Long Island bought 95 cars from the American Car & Foundry Company, which is also to build 25 cars for the Burlington, and the Philadelphia & Reading placed 50 cars with Harlan & Hollingsworth Corporation. The Chicago & Northwestern is inquiring for 1500 to 2500 freight cars and the Buffalo, Rochester & Pittsburgh is inquiring for 1000. We quote plain structural material and plates, mill shipments, at 1.40c. to 1.45c., base, Pittsburgh, or 1.56c. to 1.61c., New York; steel bars, mill shipments, are 1.40c., Pittsburgh, or 1.56c., New York, and bar iron, 1.40c. to 1.45c., New York; we quote shipments from store at 2.10c. to 2.15c. for plain material; 2c. to 2.05c. for steel bars and 2.05c. to 2.10c. for iron bars.

Ferroalloys.—The European producers have again reduced the price of 80 per cent. ferromanganese, and it now stands at \$52.50, Baltimore. A few sales have been made recently at \$56 and also at the new price of \$52.50, but the tendency is to wait except in the case of actual needs. The greater part of the inquiries of 3000 tons before the market last week are still pending. A fair business is being done in ferrosilicon at the usual quotations of \$75, Pittsburgh, for carloads; \$74 for 100 tons, and \$73 for 600 tons and over.

Cast-Iron Pipe.—Quiet conditions prevail. Little general demand is coming out, while public lettings are few and unimportant. Carload lots of 6-in. are quoted at \$23 to \$24 per net ton, tidewater, New York, according to weight of pipe and quickness of shipment.

Old Material.—The market appears to be even more profoundly dull than it has been. Dealers are doing almost nothing. Inquiries are wholly lacking. Some pressure to sell is observed among the smaller dealers, but large holders are waiting patiently for the resumption of buying and maintain their quotations, which are as follows, per gross ton, New York:

Old girder and T rails for melting	.....	\$9.25 to	\$9.75
Heavy melting steel scrap	.....	9.25 to	9.75
Relaying rails	.....	21.50 to	22.00
Rolling rails	.....	12.50 to	13.00
Iron car axles	.....	22.00 to	22.50
Steel car axles	.....	16.00 to	16.50
No. 1 railroad wrought	.....	12.50 to	13.00
Wrought-iron track scrap	.....	11.00 to	11.50
No. 1 yard wrought, long	.....	10.50 to	11.00
No. 1 yard wrought, short	.....	10.00 to	10.50
Light iron	.....	3.50 to	4.00
Cast borings	.....	5.50 to	6.00
Wrought turnings	.....	5.00 to	5.50
Wrought pipe	.....	9.00 to	9.25
Carwheels	.....	12.00 to	12.50
No. 1 heavy cast, broken up	.....	11.25 to	11.75
Stove plate	.....	8.50 to	9.00
Locomotive grate bars	.....	7.50 to	8.00
Malleable cast	.....	9.00 to	9.50

Metal Market

NEW YORK, October 1, 1913.

The Week's Prices

Cents Per Pound for Early Delivery

	Copper, New York		Tin, New York	Lead, New York		Spelter, New York	
	Lake	Electro-lytic		New York	St. Louis	New York	St. Louis
Sept. 25	16.87½	16.75	42.00	4.70	4.55	5.75	5.60
26	16.75	16.62½	41.60	4.70	4.55	5.75	5.60
27	16.75	16.50	41.00	4.70	4.55	5.70	5.55
29	16.62½	16.50	41.45	4.65	4.50	5.65	5.50
30	16.62½	16.50	41.00	4.65	4.50	5.60	5.45
Oct. 1	16.62½	16.50	40.75	4.65	4.50	5.60	5.45

Copper offered by second hands is several points lower, but there is no inclination to buy. Tin consumers have refrained from buying and prices have declined. Lead is weak at lower quotations. Spelter prices have declined in the absence of buying. Antimony continues inactive and without change.

New York

Copper.—While the large agencies have continued to quote electrolytic at 16.75c., cash, New York, or 16.87½c., 30 days delivered, resale lots have been offered at much lower prices. In some instances, to the certain knowledge of the trade, offerings have been made at 16.50c., while there are reports that 16.45c. cash would be taken. As a matter of fact, however, there is no inclination on the part of consumers to buy, and all prices are strictly nominal. Lake was offered on September 25 at 16.75c., which was ¼c. under what the big agencies were asking, but no takers were found. Since then some brands of Lake have been offered at 16.62½c., cash. On the other hand, 17c. and over could not buy some high class brands because of their scarcity. One explanation for the peculiar state of the market, in view of its sudden rise in the last two or three weeks, is that while it is strong statistically there is a widespread feeling that prices were forced up too quickly, thereby causing a loss of confidence. Another reason is that there are comparatively large amounts of copper in second hands, while at the same time consumers are well filled up for October and November delivery and do not care to go further into the future than they have gone. Quotations in London to-day were £72 17s. 6d. for spot and £72 15s. for futures. The exports in September totaled 31,733 tons.

Pig Tin.—This market has been as dull if not more so than that in copper, and as one consequence prices have declined until to-day 40.75c. is quoted. The Banca sale in Holland on September 25 realized 116½ florins, equal to 42.30c. delivered, New York. While this was a

fair price it did not have a sustaining influence on the market. One alleged reason for this is that sales were made in London the day before the Banca sale for the purpose of sustaining the price in Holland. Later London broke and prices fell away. Still another quieting feature was the expectation, which was fully realized, that the September statistics would prove unfavorable. Deliveries into American consumption in September were light, amounting to 3100 tons. The total for nine months this year shows a decrease of 300 tons compared with the same time last year. In stock and on dock and landing September 30 were 2542 tons and there was afloat 2815 tons. The total visible supply September 30 was 12,943 tons, which was 302 tons below that of September 30, 1912. Arrivals in September amounted to 4234 tons. The London quotation to-day was £187 for both spot and futures.

Lead.—Conditions are much the same as they were a week ago, except that the softness is accentuated and the market may now be called weak. Although the leading producer adheres to 4.75c., New York, a reduction is expected daily. In the week sales were made at 4.70c. and later at 4.65c., New York. The demand is light. Consumption is fairly good, and it is believed that consumers will come into the market before long. Many of them are known to have held the opinion that recent prices were higher than conditions justified.

Spelter.—In the absence of demand the market is weak at 5.60c., New York, and 5.45c., St. Louis, and the probability is strong that these prices can be shaded to 5.55c., New York, and 5.40c., St. Louis.

Antimony.—As heretofore stated, business in antimony is waiting almost entirely on the change in the tariff. Dealers make no pretense of carrying any large stock in their warehouses. For some time they have withdrawn from Government custody only such metal as they have actually sold, and consumers likewise have left in bond metal for which they did not have any immediate need. Quotations are 7.75c. to 8c. for Hallett's, 8.30c. to 8.40c. for Cookson's and 7.25c. to 7.50c. for Chinese and Hungarian grades.

Old Metals.—Conditions continue as previously reported, with prices unchanged.

Chicago

SEPTEMBER 29.—Some contracting has been done for November Lake copper, but the uncertainty surrounding the probable output has limited selling. Spelter prices appear to have softened slightly, and lead quotations while maintained without change by the principal producers are reported in other directions at concessions of from \$1 to \$2 per ton. We quote as follows: Casting copper, 16.75c.; Lake, 17c. to 17.25c., for prompt shipment; small lots, 1/4c. to 1/2c. higher; pig tin, carloads, 42.50c.; small lots, 44.50c.; lead, desilverized, 4.70c. to 4.75c.; corroding, 4.95c. to 5c., for 50-ton lots; in carloads, 2 1/4c. per 100 lb. higher; spelter, 5.55c. to 5.60c.; Cookson's antimony, 10.50c., and other grades, 9.75c., in small lots; sheet zinc, \$8, f.o.b. La Salle or Peru, Ill., less 8 per cent. discount in carloads of 600-lb. casks. On old metals we quote buying prices for less than carload lots: Copper wire, crucible shapes, 14c.; copper bottoms, 12.75c.; copper clips, 13.25c.; red brass, 12.75c.; yellow brass, 9.50c.; lead pipe, 4.12 1/2c.; zinc, 4.25c.; pewter, No. 1, 26c.; tinfoil, 32.50c.; block tin pipe, 36c.

St. Louis

SEPTEMBER 29.—A gradual recession has taken place in both lead and spelter, the close to-day being at 4.50c. to 4.52 1/2c. for lead and 5.50c. to 5.55c. for spelter. Lake copper closed at 17.35c. to 17.40c.; electrolytic copper, 17.10c. to 17.22 1/2c.; tin, 41.75c. to 41.95c.; Cookson's antimony, 8.65c. Joplin ore prices are slightly lower. Although a few lots of zinc ore brought a basis price of \$47 per ton for 60 per cent., with one or two settlements reaching \$50 for 63 per cent., most of the sales ranged from \$44 to \$46. Calamine sold for \$21 to \$23 on a basis of 40 per cent., while the top settlements reached as high as \$27. Lead ore, 80 per cent., brought \$58, the price prevailing for several weeks. On miscellaneous scrap we quote as follows: Light brass, 5.50c.; heavy brass and light copper, 10c.; heavy copper and copper wire, 11.50c.; zinc, 2.75c.; tea lead, 2.75c.; lead, 3c.; pewter, 24c.; tinfoil, 30c.

The Pennsylvania Railroad announces that the electrification of the New York division from Broad street station to Chestnut Hill, 12 miles, for passenger traffic will be completed by the fall of 1914 at a cost of \$1,250,000. The electrification of the main line to Paoli, 20 miles, was authorized some time ago.

Iron and Industrial Stocks

NEW YORK, October 1, 1913.

Adverse influences have predominated the past week, among them being renewed trouble in the Balkans causing anxiety in Europe and depressing security values on the leading European exchanges, with which securities in this country have sympathized, while impending tariff changes are given as the cause of an attack on steel stocks. To this general condition the Bethlehem Steel stocks have been conspicuous exceptions. The range of prices on active iron and industrial stocks from Wednesday of last week to Tuesday of this week was as follows:

Am. Can. com.....	32 1/2 - 34 1/2	Pressed Steel. com.....	25 1/2 - 26 1/2
Am. Can. pref.....	93 - 95 1/2	Railway Spring. com.....	25 - 26
Am. Car & Fdy. com.....	44 - 46	Railway Spring. pref.....	97
Am. Loco. com.....	31 1/2 - 33	Republic. com.....	21 - 24
Am. Loco. pref.....	102 - 103	Republic. pref.....	85 - 88 1/2
Am. Steel Foundries.....	29	Rumely Co. com.....	20 - 21
Bald. Loco. com.....	43 - 44 1/2	Rumely Co. pref.....	45 - 52 1/2
Bald. Loco. pref.....	104 - 105	U. S. Steel. com.....	58 1/2 - 63 1/2
Beth. Steel. com.....	34 1/2 - 35 1/2	U. S. Steel. pref.....	108 - 109 1/2
Beth. Steel. pref.....	72 - 74	Va. I. C. & Coke.....	45
Colorado Fuel.....	29 1/2 - 32 1/2	Westinghouse Elec.....	69 1/2 - 71 1/2
Deere & Co. pref.....	97	Chic. Pneum. Tool.....	53 - 54
General Electric.....	145 1/2 - 146 1/2	Cambria Steel.....	50 - 52 1/2
Gr. N. Ore Cert.....	34 1/2 - 38 1/2	Lake Sup. Corp.....	25 1/2 - 26 1/2
Int. Harvester. com.....	108 1/2 - 108 3/4	Warwick.....	10 1/2
Int. Harvester. pref.....	114 1/2 - 114 3/4	Crucible Steel. com.....	15 1/2 - 16 1/2
Int. Pump. com.....	7 1/2	Crucible Steel. pref.....	89 1/2 - 92 1/2
Lackawanna Steel.....	36 1/2 - 38 1/2	La Belle Iron. com.....	45 1/2
Nat. En. & St. com.....	13 - 13 1/2		

Dividends Declared

The Westinghouse Electric & Mfg. Company, regular quarterly, 1 1/4 per cent. on the preferred stock, payable October 15, and 1 per cent. on the common stock, payable October 30.

The Yale & Towne Mfg. Company, regular quarterly, 1 1/2 per cent. and an extra of 1 per cent., payable October 1.

The Emerson-Brantingham Company, regular quarterly, 1 1/4 per cent. on the preferred stock, payable November 1.

Machine Tool Trade Abroad Improving

C. N. Thorn, vice-president Allied Machinery Company of America, who has charge of the Paris office and general European business of the company, arrived in New York September 23 on a short visit, his plans calling for his departure on October 7. In his absence Charles E. Carpenter, general sales manager, is in charge in Paris. Mr. Thorn says the summer has been quiet in the machinery line in Europe, but that an improvement has set in and a good fall is anticipated. Business in Switzerland is particularly good, and in Zurich, where a small office has been maintained, the company has taken a large store on a prominent street where a stock of American machine tools will be displayed. Since the close of the Balkan war there has been much improvement in the countries most affected, notably France, though Austria-Hungary is still suffering from the setback which the war inflicted. Big manufacturing plants in Budapest recently visited by Mr. Carpenter were working only about half their normal number of employees. The Allied Machinery Company is constantly looking to extend its field of operations, Mr. Thorn said, and shortly after January 1 will establish a branch in Germany. He also said that few Americans interested in machine tools who visit Europe fail to visit the Paris office of his company and that all are welcome.

Record Order for Gear Cutting Machinery.—The Ford Motor Company, Detroit, Mich., has placed an order for 66 gear cutting machines with the Gleason Tool Works, Rochester, N. Y., and has practically closed for turret lathes and is to purchase before October 15 a large amount of other machinery to equip the plant for making drop forgings and other automobile parts now furnished to the Ford Company by others. It is stated that the order for gear generators is the largest single order ever placed and that it will make the department the largest gear-cutting department in the world.

Because of its inability to secure a settlement with the Sons of Vulcan (puddlers), the A. M. Byers Company, operating a puddled-iron plant at Girard, Ohio, one of the largest in the country, has decided to resume operations on the open shop plan.

Pittsburgh and Vicinity Business Notes

The Riter-Conley Mfg. Company, Pittsburgh, has received a contract for furnishing and erecting structural steel work for a building at Balboa, Panama Canal Zone, requiring about 300 tons of steel, and also a contract from the Elro Irrigation & Power Company for additional parts for transmission line towers, numbering about 1200.

The annual meeting of stockholders of the Treadwell Construction Company, builder of plate work, was held at Midland, Pa., September 24, at which the following officers were elected: M. H. Treadwell, president; Sam N. Craig, vice-president; B. W. Hunsicker, secretary, and H. N. Dougherty, treasurer. They, with J. H. Killinger, R. M. Dorsey, John S. Craig and A. K. Hamilton, comprise the board of directors. The company reports that its plant is operating to full capacity, with considerable business booked.

The New River Silica Company, Charleston, W. Va., has been incorporated with \$50,000 capital stock by W. D. Payne, Berkeley Minor, Jr., E. C. McCoy and others.

The Sutton Folding Crate Mfg. Company, Sutton, W. Va., has been incorporated with \$50,000 capital stock to manufacture crates for the shipment of eggs, fruit, etc., by W. H. Lee, E. L. Juergens, C. H. Bland and others.

The Follansbee Brothers Company, Pittsburgh, operating an open-hearth steel plant and sheet and tin plate mills at Follansbee, W. Va., denies the report that it will erect a brick plant and open a coal mine at Irondale, Ohio. The company states it has no connection whatever with any enterprises at Irondale.

The Spence-Baggs Stove Company, Martins Ferry, Ohio, has replaced its engines with electric motors. A 35-hp. motor will drive the main line shaft and a 15-hp. motor will drive the fan for the cupola. The motors were furnished by the Westinghouse Electric & Mfg. Company.

The Value of a Dollar's Worth of Labor

An article under the title here given was contributed by Irving A. Berndt, Joseph T. Ryerson & Son, in *Efficiency*, the official organ of the Western Efficiency Society, Chicago. Generous extracts from the article are as follows:

A comparison of the relative importance in which labor and equipment are held by the management of the average organization, is both interesting and appalling. On a punch press costing \$3000, the yearly cost, on a basis of 10 per cent. for depreciation and 5 per cent. for interest on the investment, would be \$450. The operator of this machine would probably be paid \$3 per day, a total of about \$900 a year or just twice the cost of the machine per year. The only apparent difference is that the machine is paid for in advance, while the labor is paid for in weekly, bi-monthly or monthly installments.

Selecting the Machine but Not Worker with Care

When purchasing a machine the management usually delegates its best engineer to make the choice. This man will first study the work to be done by the machine and its qualifications. He will then investigate the different types of machines capable of doing the work, studying them carefully and scientifically, using his best knowledge to determine their various efficiencies and capacities. In a great many cases he finds this mechanical efficiency so well standardized that a brief statement will give the exact capacity, making investigation unnecessary and decision a question of price. The purchase price of the machine decided upon will usually be made only after the highest authorities in the organization have approved the choice.

How is the choice of labor made in the average organization? It is probably left to an overburdened foreman or superintendent who has not the time to study the necessary qualifications. This is due to the fact that he is called upon to choose a large number of men quickly. Neither has he the scientific training nor the knowledge necessary to make wise selections. He has few if any standards to go by, and his choice is controlled by his judgment and experience, limited by the lack of variety and the numbers from which he is compelled to choose. Having no standards to guide him as to the wage value of men, he is always limited to certain current rates which may or may not be correct.

In some cases the choice of labor is left to an employment department. This is, of course, a step in the right direction, but oftentimes these departments, through a lack of knowledge, scientific training, standards and systematic data, are nothing more than registration bureaus where only superficial examinations are made of applicants. Harrington Emerson declares that three-fourths of the industrial workers have no aptitude for the positions they fill. Would it not seem disastrous if the same proportion of the equipment was relatively incapable? Inasmuch as the production of the machine, unless it be automatic, depends largely upon the man, is it not only fair that the choice of the man be given as much thought as the choice of a machine? There is the maintenance or repair department, which is generally an important part of an organization. In how many plants do we find any department corresponding to this, the purpose of which is to maintain the general efficiency of employees? There are certainly few men who hold the same position to labor that a master mechanic or millwright does to equipment.

Ill-Considered Discharging of Men

If a foreman wishes to scrap or throw out a machine he must bring forth some good reasons for so doing before he receives the sanction of the management. Yet, how simple the process of discharging a man! In many cases all that is necessary is a statement that he is undesirable, and even if the management does not credit this assertion, what arguments, data or records does it have to convince the foreman of error?

Each man discharged and replaced is an added expense, due to the time spent in hiring him, starting him to work, inefficiencies in the first week of his employment, spoiled work, to say nothing of the danger of having to hire and try out a number of men before a satisfactory one is found. In some plants an average of from three to five men are employed for each man needed during the year, while it is nothing unusual for one position to be filled by as many as nine men in a year. It is also a fact that some plants, especially machine shops, allow the first week of each new employee's time to cover the cost of hiring, spoiled work, inefficiencies, and so on. Take, for instance, a plant employing 300 men and suppose that for each position two men were hired during the year. At a cost of \$7.50 for the first three days of each man's time, the total would amount to \$4500 for the year.

Book Review

Hendricks's Commercial Register of the United States.

Twenty-second annual edition. Pages, 1635, 7¼ x 10¼ in. Published by S. E. Hendricks Company and supplied by *The Iron Age*, Book Department, 239 West 39th Street, New York City. Price, \$10 net.

Since its conception in 1891, the number of pages contained in this book has increased with each issue. The total number of classifications is in excess of 55,000, an increase of approximately 10 per cent. over 1912, and each of these represents the manufacturer of or the dealer in some machine, tool, specialty or material required in the iron, steel, hardware, architectural, electrical, engineering, mechanical, railroad, contracting, mining, mill, quarrying and exporting industries or by some of the innumerable trades and professions. The present edition represents approximately 390,000 names and addresses.

The arrangement of classifications is such that the book can be used readily for either purchasing or mailing purposes, the manufacturers being first classified under a general heading for a particular industry for mailing list purposes, and each of the firms or corporations appear again under as many of the sub-classifications as the different varieties of its product call for. Considerable information is also given, following the names of firms, as assistance to the buyer, saving the time and expense of writing to a number of them when a particular article is desired. A very helpful feature is the inclusion of trade names of all articles classified in the book as far as they could be secured. These trade names appear in parentheses between the names and addresses of the various firms given under the different classifications.

Patents and Modern Industrial Conditions*

Our Patent System Should Not Be Weakened—Invention Should Be Encouraged

—BY F. P. FISH—

Patent protection does not alone stimulate the inventor; it excites to strenuous effort a long line of intermediaries, capitalists, investors, business administrators, licensees and users whose co-operation is vitally necessary that the invention may actually get into use. The ultimate consumers get their advantage, even during the term of the patent, in less cost, added facilities, increased comfort and greater conveniences; and their gain, while the patent is in force, is in almost every case infinitely greater than that of those who profit directly from working under the patent. When the patent expires the invention is free to all.

Until 1888 Switzerland had no patent law. It was argued that, situated in the heart of the industrial world, with a docile and intelligent population, trained by admirable education, and with great advantages of water power, it could progress more rapidly if its citizens were free to appropriate ideas, patented or unpatented, of the rest of the world, without any monopoly to individuals in Switzerland itself. This policy was, however, found ill advised. The Swiss were not encouraged to invent, or adopt and introduce inventions. They did not develop the desire to improve. Their industries did not advance.

Under the necessity that inventions should be fostered, if industrial progress in competition with patent-granting countries was to be secured, a patent law was adopted in 1888. Since then there have been over 50,000 patents issued and industrial progress has been marked.

Holland in 1869 abolished her patent law, undoubtedly in the hope that her situation made it more for her interest to take freely the inventions outside than to attempt to develop inventions and inventive habit. She has, after more than a generation, again established a patent system.

Inventors Helpless Without Patents

Nowhere can it be worth while to invent, unless there is opportunity for utilizing inventions. If every citizen were an Edison, it would not profit him to work out new ideas unless they could be introduced with the chance of a proper return. An adequate patent system gives the inventor, who as a rule never could himself do anything with his invention, something tangible and of value, which he can transfer, in whole or part, to the business enterprises which alone can make the invention of value. Inventors and business men to the same degree and for the same reason are stimulated to efforts they would never otherwise make. Each class would be helpless without the other. Even if the invention meets a real demand, there is frequently occasion for the expenditure of a vast amount and of the greatest intelligence and energy before commercial success, and always there is the chance of utter failure.

Neither in Switzerland nor Holland, nor elsewhere, could capital be expected to push new inventions under conditions where, if success were achieved, the full benefit would be immediately shared by all competitors. In fact, competitors would have a great advantage. They would have borne no part of the burdens and expense.

Superiority of American Patent System

The standards and rules imposed by foreign patent laws as to working inventions, and grant of compulsory licenses, are and must be purely arbitrary. Even if wrong in principle, they may operate reasonably well as to some inventions. But they are fatally destructive in many cases, and no man inclined to invent or promote invention can be sure that any particular invention will not be one of a class rendered unprofitable because the law fails to give a free field for effort during term of the patent.

The working clauses and compulsory license clauses of foreign patent laws are hostile to real public interest, and operate greatly to the discouragement of invention. The simple provision of the United States law that after the grant of a patent the owner shall control the invention absolutely for a short but definite term, having no more payments to make and no fear of interference from com-

petitors, gives a far greater stimulus to invention than does any other country.

The result is that today there are not only a very large number struggling with inventive problems or on the lookout for opportunity to invent, but effort has been systematized in accordance with scientific principles of modern business. With large enterprises, invention is as much a part of the systematic organization as manufacturing or selling. Intelligent men are employed to determine problems of the business and find in what direction improvements should be made that there may be extension into new fields, increased production, greater economy, or an improved product. Highly trained engineers and inventors attack the problems in well-equipped laboratories. Meantime, as always, individuals, even the most humble, are inventing or hoping to invent. They know that nothing is more likely to advance them in wealth and comfort than an invention.

Patent System Imperative

Incessant industrial improvement is essential to our well being. In the practical arts there is no such thing as a stable condition. Up to a recent time our situation has been such as to promote industrial development. We have had an enormous amount of free land open to cultivation. This has now been practically exhausted. This affects our industrial situation disadvantageously. We must use every weapon to neutralize the loss.

Prevailing popular sentiment and new laws and new interpretation of old laws based on that sentiment require a definite readjustment of business and business methods. But the process of readjustment will surely be one of shock to our industries. It is a time in which we should hold to any feature of our social organization that is right.

Foreign competition is sure to be more serious. Today except for the artificial protection of tariffs, the whole world, because of improvements in transportation due to invention, is in immediate competition. No industry can thrive in any country unless that country has peculiar advantages, natural or acquired, to produce at such low cost as to meet competition. Natural advantages of the United States are great in some directions, but by no means controlling as to many industries. In our competition we are hampered in many ways. In cost of production we are embarrassed by high cost of labor. We have more than held our own partly because we have surpassed all other countries in shop and business organization, but chiefly because of our superiority as inventors and in the quick and comprehensive adoption of inventions. If the process of continuous improvement is checked, we shall lose this advantage and there will be no alternative except destruction of some or many most important industries or a reduction in wages and standard of living.

Less Opportunity

Opportunity for improvements based on invention is in many branches growing less every year. There is no longer room for the striking advances in agricultural machinery, machinery for fabrics and shoes, electrical and other power apparatus, machinery employed in production and working of wood and metals and other great departments that there was a few years ago. It may be said that many arts are already developed almost to the point of saturation. There should be every possible incentive to develop an incessant series of minor improvements which may aggregate great possibilities of advancement. The latter are of a kind that especially requires encouragement, for they do not greatly appeal to the imagination. They are not often developed as the result of a happy thought. Close and careful study and scientific effort at great expense are generally required. Agriculture and production of food products may be revolutionized during the coming century by chemical inventions. In other fields there is room for many great improvements, which cannot be realized unless our patent system affords requisite encouragement.

More than ever there are causes at work which depress enthusiasm and hold back development. The Oldfield bill reported to the House of Representatives at Washington is a most serious attack on our patent system. Any provision preventing the imposition of conditions as part of a sale or license of a patented article or of the contract authorizing its manufacture or use, or any requirement that would impose a penalty if the invention

*From a paper read before the American Bar Association, Montreal, September, 1913.

was not manufactured, and particularly any requirement by which under any circumstances a license to use the invention could have been acquired for the asking by a person or corporation to whom the patent owner did not wish to grant a license would undoubtedly have checked invention and the development of inventions to a marked degree. The testimony before the Oldfield committee of those familiar with the subject is practically unanimous on this point. And yet it is just such an inroad upon the established law of the land that characterizes the Oldfield bill.

The community as a whole requires for its prosperity an adequate patent system. I believe that ours is adequate; that it would be a national misfortune if it were weakened as proposed by the Oldfield bill.

Personal

James A. Farrell, president of the United States Steel Corporation, made an address on "Our Foreign Trade" at the annual meeting of the American Manufacturers' Export Association at the Hotel Astor, New York, September 25.

Dr. Rudolf Diesel, inventor of the famous Diesel oil engine, is reported to have disappeared while on a steamer going from Antwerp to London, September 30. While it is feared he lost his life by falling overboard, further details are awaited.

Charles A. Vogt, auditor of the American Steel & Wire Company, was elected a director of the company at a meeting of the board held in New York, September 30, filling the vacancy caused by the death of Fred H. Daniels, of Worcester, Mass.

Dr. S. W. Stratton, chief of the Bureau of Standards, Washington, D. C., is in Europe on official business.

Richard Peters, Jr., formerly purchasing agent of the Birmingham Coal & Iron Company, Birmingham, Ala., is now connected with the W. J. Rainey coke interests at Uniontown, Pa.

William L. Garcia, who has been with the Fairbanks Company for the past eight years as manager of the engineering and power transmission department, has resigned to take full charge of the complete engineering and power transmission department equipped by Flint & Chester, Inc., 237-239 Lafayette street, New York City, effective October 6.

O. G. Smith, for some years identified with the Platt Iron Works, Dayton, Ohio, has been put in charge of the Chicago office of the machinery department of the Bethlehem Steel Company, of which C. von Philp, Bethlehem, Pa., is manager. Mr. Smith's headquarters will be in the Peoples Gas Building, Chicago.

James W. Wellington, New Castle, Ind., factory manager of the Maxwell Motor Company, on concluding, September 30, eight years of continuous service at the factories of that company and its predecessor, the Maxwell-Briscoe Motor Company, announces his retirement from the company.

Charles W. Allen, a vice-president and director of the L. J. Bardo Company, Philadelphia, has been made manager of the railroad department of the Reading-Bayonne Steel Casting Company, with headquarters in Reading, Pa.

John M. Sherrerd has become associated with the Stroh Steel-Hardening Process Company, House Building, Pittsburgh, Pa., which has a process of hardening the wearing surfaces of gears and steel cast products.

Joseph G. Butler, Jr., was the central figure of the opening ceremonies of the Hotel Ohio, Youngstown, Ohio, September 29, and was the principal speaker at the celebration banquet that evening.

John L. Bishop, assistant sales manager of the Cincinnati Milling Machine Company, Cincinnati, Ohio, will sail from New York October 2 on a business trip to Europe.

Charles Kayser, Cincinnati, Ohio, has been appointed assistant traffic manager of Rogers, Brown & Co., succeeding A. O. Galloway, who recently accepted a position with the Philip Carey Mfg. Company.

Bright Sage has been appointed general manager of the Bremen Mfg. Co., Bremen, Ohio, maker of caloric engines, succeeding H. E. Young, deceased.

Jonathan R. Jones, vice-president and treasurer of the Alan Wood Iron & Steel Company, Philadelphia, has returned from a month's vacation.

Obituary

EDWIN T. MOORE, secretary and treasurer of the Coatesville Boiler Works and a director and member of the executive board of the Coatesville Foundry & Machine Company, died at his home in Coatesville, Pa., September 25, aged 47 years. When but 21 years of age he entered the employ of the boiler company as a clerk and in 10 years he mastered every detail of the business and had risen to the position of secretary and treasurer. Two years later he was made general manager of the plant. It was mostly due to his energy and hard work that the company has grown to its present proportions. He was also instrumental in organizing the Coatesville Foundry & Machine Company, which, since its establishment five years ago, has become an important industry. Mr. Moore was also prominently connected with a large number of local institutions.

SAMUEL SMYTH, West Pittston, Pa., died September 22, aged 72 years. He was born at Harford, Pa., was educated at a local academy, and at an early age turned his attention to improvements in stoves. He invented various forms of grates, including the duplex, which is so generally used in stoves, ranges and house heating apparatus. For many years he was connected with the Pittston Stove Company. For a long time he had an editorial connection with the Metal Worker, one of the publications of the David Williams' Company, and thus greatly extended his acquaintance in the stove trade and increased his usefulness to that branch of the industry. He leaves a son and a daughter. The son is H. C. Smyth, a lawyer, residing at Wilkes-Barre, Pa.

WILLIAM A. INGHAM, engineer, scientist, lawyer and capitalist, Philadelphia, Pa., died suddenly September 23, aged 86 years. Notwithstanding his advanced age, he had been actively engaged in business until within a few days of his death. He was president of the Highland Coal Company, Broad Top Improvement Company, Union Development Company and Beverly Ore Company. For 28 years he served as president of the Rockhill Iron & Coal Company, and at the time of his death was vice-president and chairman of its board of directors. He was formerly secretary of the Geological Survey of Pennsylvania, and was a member of the Franklin Institute, American Philosophical Society and American Institute of Mining Engineers.

H. W. HARTMAN died September 29 in the Mercy Hospital, Denver, Col., aged 63 years. He was a native of Martinsburg, Pa. He was one of the pioneers in the manufacture of wire nails in America, having built a wire-nail factory at Beaver Falls, Pa., in 1883, which was operated under the name of the Hartman Steel Company. The plant was sold some years later to the Carnegie Steel Company, finally became the property of the American Steel & Wire Company, and was dismantled in 1903. Mr. Hartman was also one of the organizers of the Union Drawn Steel Company at Beaver Falls. In recent years he had been active in developing Ellwood City, Pa. He leaves a widow and two sons.

T. FRAME THOMSON, chairman of the board of directors of the Otis Steel Company, Cleveland, Ohio, accidentally shot himself Tuesday, September 30, while unloading a gun at his home, Caen Wood Towers, Highgate, near London, England. He was a partner in the firm of Strain, Robertson & Thomson from 1890 to 1895 and from 1895 to 1900 he engaged in practice as a civil engineer in steam railroad work. He was a member of the Institution of Civil Engineers, London; the Société des Ingénieurs de France, the Iron and Steel Institute and the American Iron and Steel Institute. He was 46 years old.

WILLIAM ELLIOTT, one of the founders of the Elliott Frog & Switch Works, East St. Louis, Ill., died September 26, at the Jewish Hospital in St. Louis, following an operation. He leaves two children. His son, Harry J. Elliott, is interested in the company.

JOHN M. DRURY, for 10 years general manager and secretary of the National Metal Wheel Company, Toledo, Ohio, died September 20, aged 43 years.

The last of the 12 hot mills at the new plant of the Trumbull Steel Company, Warren, Ohio, were placed in operation last week.

The Frick Electric Steel Induction Furnace

Results Achieved at the Krupp Plant at Essen—Comparison with Other Furnaces—Future of the Electric Furnace

An important paper of great length on "The Electric Refining of Steel in an Induction Furnace of Special Type" was read by Otto Frick, London, before the Brussels meeting of the Iron and Steel Institute. The author devotes much space to the future development of the electric furnace, not so much from a general point of view as from that of the use of the Frick induction furnace, his own invention. The conclusions presented are based entirely on results obtained in the Frick furnaces at the Krupp works in Essen, Germany. Mr. Frick believes "the time will come when half the steel produced will have been passed through the electric furnace." The salient points in the paper are abstracted as follows:

The Installation at Krupp's

Two furnaces of the Frick type are at work in Essen. The first furnace came into regular operation in August,

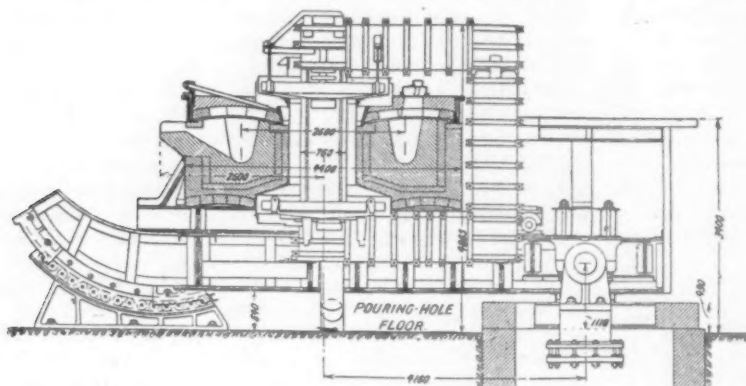


Fig. 1—Longitudinal Section

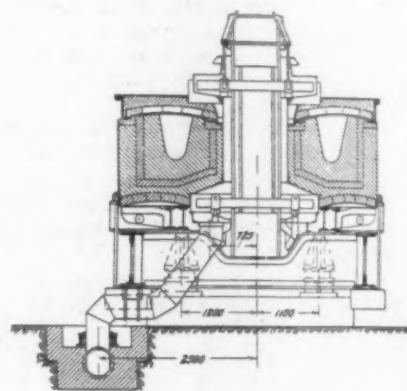


Fig. 2—Transverse Section

TEN-TON FRICK FURNACE, 1000 HP., AT THE KRUPP WORKS, ESSEN, GERMANY.

1908. The second furnace, originally of the Kjellin type, was rebuilt on the same principle as the first Frick furnace. The data relating to these furnaces are:

Raw materials	cold scrap of good analysis
Capacity	10 tons
Kilowatts for which furnace designed...	736
Actual working capacity	8.5 tons
Weight of casts	6.5 tons
Average power used	650 kw.
Frequency	5 cycles per sec.
Voltage	5000
Power factor, cosine ϕ at 8.5 tons	0.53
Average duration of one heat	6 hr. 45 min.

Theoretical power consumption per ton, 432 kw-hr. calculated:

Average electrical loss	4.5 per cent.
Average radiation loss	160 kw.
Average total efficiency	70 per cent.

Figs. 1, 2 and 3 give a clear idea of the design of the 10-ton 1000-hp. Frick furnace at Essen, Fig. 1 showing the longitudinal section, Fig. 2 the transverse section, and Fig. 3 the plan.

The furnaces are used for the melting of cold scrap into various products. Table 1 gives the analysis and the mechanical properties of a number of steels made in these furnaces. In designing the furnace an attempt was made to fulfill the following conditions:

Conditions to Be Met

Rotating Cover.—As the furnace was to be used for melting cold scrap only without any refining, the original type with a rotating cover was chosen, specially designed for the treatment of cold scrap and offering the advantage of easy charging and distribution over the whole crucible without any delay or trouble. The rotating cover further facilitates the supervision of the metal and of the furnace walls. Additions of slag or alloys are quickly and evenly distributed over the bath. The design of the cover has proved most satisfactory for its purpose.

Losses and Efficiency.—The most essential points with regard to the design of electric furnaces are the efficiency and power consumption. The efficiency is dependent alone on the care with which the losses, consisting of electric losses and radiation losses, are kept down.

The electric losses, that is, the losses in the primary coils and in the magnetic iron core, are reduced by giving these parts ample dimensions. Notwithstanding the great weight of the core, nearly 45 tons, the total electric loss in the furnace in Essen only amounts to 4.5 per cent. of the total energy supplied to the furnace. Of greater influence on the efficiency are the losses due to radiation. The author has made a careful study of the heat conductivity of refractory materials at highest temperatures, and has provided his furnaces with insulated walls in accordance with the results.

Further, great care was taken to make the doors in the

cover tight and as easy as possible to keep closed. By these means the radiation losses were reduced to a minimum. Comparative calculations have shown that the radiation loss of the Kjellin furnace exceeds that of the Frick furnace by 75 kw. or 48 per cent., which also involves an increased cost for current, labor, and lining in the case of the former.

As an example, a run of six weeks' duration may serve. The calculated costs are not based on any actual figures from the Krupp plant, as no such are available, but for the comparison the estimated figures will be close enough:

	Type of furnace—Kjellin	Frick
Output in six weeks, good ingots, tons.....	696	850
563,500 kw-hr. at 0.43 penny.....	20,250	5,900
Labor estimated at.....	5,900	2,000
Lining	2,000	450
Light, cooling fan, etc.....	450	
Total costs in six weeks.....	28,600	33,70
Costs per ton of ingot.....	41.10	7.40
Saving by Frick furnace, per ton.....		6,300
Saving by Frick furnace, per campaign.....		44,000
Saving by Frick furnace, in one year of seven campaigns with one furnace.....		

Were 12 per cent. interest and depreciation on an estimated outlay of £12,500 also taken into account, the annual saving would be increased to £2500. These figures demonstrate the importance of low radiation losses, and prove the effectiveness of the design of the Frick furnace in this respect. Nearly six years of actual working have shown that no drawbacks have been caused by the insulation of the furnace.

Comparison with Girod Furnace

At the Krupp works a Girod furnace of 1200 kw. and 12 tons capacity has been installed next to the Frick furnace, thus giving an opportunity to compare the Frick furnace with a furnace of the arc type.

Table 1.—Electric Steel Made in the Frick Furnace at the Krupp Works in Essen

	C.	Si.	Mn.	P.	S.	Cu.	Elastic limit, kg.	Tensile strength, kg.	Elongation, per cent.	Contraction, per cent.
Screw shaft	0.38	0.23	0.30	0.020	0.024	0.06	....	50.4	27.5	65.0
Rod	0.39	0.16	0.58	0.024	0.027	0.05	37.1	59.2	23.2	64.0
Press screw	0.43	0.20	0.30	0.027	0.025	0.08	30.1	54.8	28.3	61.0
Tender shaft	0.47	0.12	0.51	0.023	0.020	0.06	....	58.1	30.5	61.0
Screw shaft	0.47	0.23	0.37	0.023	0.025	0.09	30.9	54.8	26.5	64.0
Rod	0.51	0.10	0.54	0.032	0.033	0.06	38.9	65.4	21.7	57.0
Piston-rod	0.55	0.10	0.43	0.026	0.025	0.07	....	70.7	18.3	54.0
Shaft	0.62	0.10	0.32	0.023	0.023	0.07	42.4	68.1	21.2	58.0
Rod	0.61	0.04	0.45	0.020	0.024	0.04	40.7	71.6	17.5	50.0
Tires	0.72	0.16	0.37	0.025	0.023	0.06	44.9	77.4	18.0	51.7
Tires	0.77	0.15	0.40	0.013	0.015	0.06	49.3	83.7	16.6	46.0

No accurate figures for the power consumption of the Girod furnace have been furnished by Messrs. Krupp, as in the case of the Frick and Kjellin furnaces, but for comparison the following figures represent average results, and will give a fair idea of the relative efficiency of the two types:

Kilowatt-hours per ton of steel in the Girod furnace.....1000
Kilowatt-hours per ton of steel in the Frick furnace..... 600

It may be assumed that the theoretical energy consumption of the Frick furnace is 425 kw-hr. per ton. For the Girod furnace it has been assumed to be somewhat higher, or 460 kw-hr. per ton, as it is possible that this furnace is working on a raw material with more scale or rust, and therefore under less favorable conditions.

It has been assumed that the Frick furnace has an interval of only 7½ min. between heats. For the Girod furnace two cases have been calculated, viz., for an interval of 55 min. and for one of 1 hr. 25 min. per heat, the longer intervals being necessary for charging, which has to be completed before the current can be turned on, whereas in the Frick furnace the current may be put on immediately after tapping. These calculations show:

The average loss of the Frick furnace is..... 186 kw.
The average loss of the Girod furnace is 567 to 594 kw., or about 580 kw.

over three times more than the Frick furnace, although the capacity of this latter is only 20 per cent. less.

The superiority of the Frick furnace over the arc furnace does not only depend on the better heat insulation of the former furnace, but is also founded upon the great difference between the methods of heating. In the Frick furnace the heat is generated directly in the steel bath, and consequently there is practically no heat transfer necessary, but the highest temperature prevails in the metal itself. Further, the slag acts as a very effective heat insulator, which prevents the furnace walls above the bath and the roof from becoming as hot as the bath itself.

In an arc furnace the essential part of the heat is

generated in the arc or arcs playing between the ends of the electrodes and the metal, and consequently the heat has to be transferred from these centers to the other parts of the bath by heat transmission, which requires a very high temperature in the arcs and at the lower end of the electrodes, a temperature which certainly exceeds 2500 deg. C., whereas the highest temperature in a Frick furnace never exceeds 1680 deg. C. at any part. The heat generated in the arc is spread in all directions, and according to the existing laws of nature the greater part of the heat will go in the direction of the least resistance.

It must also not be forgotten that the electrodes themselves are fairly good heat conductors, and through them no small amount of heat is conveyed away out of the furnace. In melting cold scrap the conditions are somewhat more favorable, as the electrodes are surrounded by the charge, which absorbs some of the heat otherwise dissipated towards the roof.

It may therefore be concluded that the efficiency of an arc furnace for treating liquid metal will always be less than 50 per cent., and in melting cold scrap will only slightly exceed 50 per cent. The Frick furnace, on the other hand, shows an efficiency over 70 per cent., which may be further improved with larger furnaces.

[At this point Mr. Frick discusses various difficulties offered by certain furnace linings and the effect of the inclination and rotation of the bath, its advantages and disadvantages.]

Conclusions from Results at Essen

The results of the Frick furnaces at Essen, compared with those of furnaces of other types, may thus be summarized:

1. The design with a rotating cover has been found most suitable for melting cold stock.
2. The efficiency of the Frick furnace is much higher than that of other induction furnaces and of arc furnaces. Consequently the energy consumption per ton of steel is lower, the annual production is higher, and the cost of production is materially lower than in other furnaces.

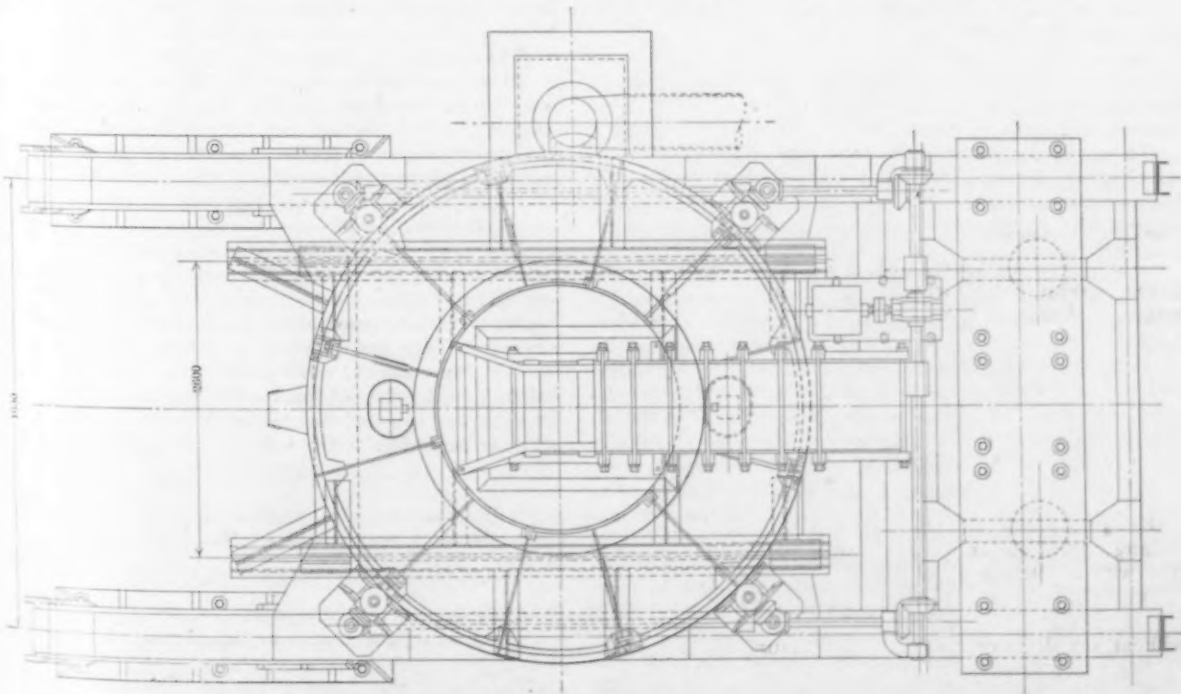


Fig. 3.—Plan of 10-ton Frick Electric Furnace, 1000 Hp.

3. The method of making the lining and of preventing the cutting by the slag has lengthened the life of the lining up to three months without repair, a result which has not been improved upon by any other furnace.

4. The inclination and rotation of the bath are sufficient to secure all possible advantages and are at the same time small enough to obviate the necessity of having too much slag to cover the bath. In this respect the Frick furnace is decidedly superior to other induction furnaces, and cannot be surpassed by arc furnaces.

It may be said that the future of the electric furnace for steel production will be in the final refining of steel, pre-melted and pre-refined either in a converter or open-hearth furnace, and that its use for melting cold stock, except in places with very cheap water power and high price of fuel, will be restricted to comparatively small quantities of high-class alloy steel, and to the melting of valuable alloys for the addition to ordinary steel, if a saving of alloy can be effected by melting under exclusion of air, as for instance in the melting of ferromanganese.

Reactions in the Induction Furnace

Among metallurgists the conviction is general that the induction furnaces are not and cannot be suitable for refining. This view is based upon the opinion that the first and most important condition for successfully carrying out refining reactions is that the slag should be thin and liquid. As, however, the slag in the induction furnace is colder than the bath, it is impossible for it to be both thin and basic enough. This opinion about the importance of a thin slag has its origin from the experience with open-hearth furnaces.

In the case of the open-hearth furnace it is certainly correct, that a practical refining is not possible without a thin slag. The author is, however, of the opinion, that the thinness of the slag is in this case only of importance for the heat transmission from the hot gases to the bath. Owing to the fact that in an induction furnace the heat is generated in the steel itself, the temperature at the contact between steel and slag becomes independent of the thinness of the slag, which may be given such a composition as will best ensure the reactions aimed at. Dephosphorization can only take place if the phosphorus in the steel has an opportunity to combine with oxygen in the presence of a slag rich in basic substances, preferably lime, and the reaction will take place so much quicker the richer in lime, and consequently the thicker, the slag is. The richer the slag is in lime, and the thicker it is, the greater is its avidity to thin and to become more easily fusible by the absorption of acids; and as it is necessary for a good dephosphorization that most of the silicon should have been previously eliminated, the only remaining acid to satisfy the slag is the phosphoric acid, which under these conditions is most readily formed.

As to the desulphurization, the idea of the importance of a thin liquid slag has apparently been strengthened by the experience with the open-hearth furnace, where it has been found next to impossible to eliminate the sulphur down to any low value. The oxidizing atmosphere of the open-hearth furnace, and the impossibility of ridding the slag of the oxides of iron and manganese, are the true causes why no desulphurization is possible in the open-hearth furnace.

Concerning the arc furnace it has been stated that desulphurization is only possible after the temperature has been raised so high as to enable the formation of calcium carbide. The publications on the Héroult furnace in this direction have undoubtedly had an influence in spreading the theory of the importance of a thin slag for the desulphurization. In an arc furnace it may be of more importance to have a thin slag, as in this type of furnace the heat has to be transmitted through the slag to the metal, but in the induction furnace it is only necessary to have regard to the best slag composition for the elimination of sulphur. Altogether excellent results with regard to desulphurization have been obtained in induction furnaces, among which those in Dommeldingen might be mentioned, where, according to analyses published in *Stahl und Eisen* of 1911, steel of 0.012 per cent. sulphur to traces, with an average of 0.008 per cent. sulphur, has been produced out of a raw material containing about 0.04 per cent. sulphur.

In the electric furnace the following reactions take place respectively, and may be carried out:

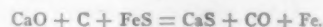
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|-----------------------|---|
| 1. Decarburization. | 6. Desulphurization. |
| 2. Desiliconizing. | 7. Recarburizing. |
| 3. Dephosphorization. | 8. Alloying with silicon, manganese, nickel, chromium, tungsten, etc. |
| 4. Deoxidation. | |
| 5. Rephosphorization. | |

[Mr. Frick enters into an exhaustive discussion of each of these reactions and of the electrical conditions. His remarks on desulphurization are especially interesting, comparing the conditions in the induction and arc furnaces.]

Method of Sulphur Removal

One of the most valuable faculties of the electric furnace is that of eliminating the sulphur down to traces in a quick and efficient manner. This is due to the neutral or reducing character of the furnace and to the basic lining permitting the use of a slag rich in lime. The exact way in which the elimination of sulphur takes place is hardly yet ascertained. The author's view is that the conditions for a quick removal of the sulphur are analogous to those for dephosphorization, and that the temperature only plays a subordinate rôle, the constitution of the slag being the most important factor, and requiring such a composition that the slag will be eager to take up substances which will increase its fluidity.

To make the desulphurization permanent it is further necessary that the sulphur, contained in the steel as iron sulphide and manganese sulphide, should enter into a combination which will not be dissolvable in the steel. The only such known combination is calcium sulphide, CaS, the formation of which thus has to be aimed at. In the arc furnace the desulphurization is obtained by carbon according to the following reaction:



It has been said that calcium carbide, CaC_2 , and not carbon is effective in bringing about the desulphurization in the arc furnace. This, however, does not seem very probable, there being no apparent reason why lime should be reduced, the oxygen forming CO and the calcium combining with more carbon only to give up the same carbon to other lime, and then itself combining with sulphur. On the other hand, it is evident that the same conditions which favor the formation of CaC_2 also allow the elimination of sulphur.

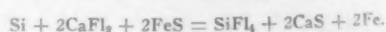
The presence of CaC_2 is thus only to be looked upon as a proof of the slag being completely deoxidized and able to absorb sulphur. It is, however, bad economy to try to produce calcium carbide in a steel furnace.

In the induction furnace the desulphurization is much more quickly effected by ferrosilicon, which in this reaction offers the same advantages as mentioned with regard to deoxidation. As it is wanted to form calcium sulphide, and as calcium possesses a very strong affinity for oxygen, it is not possible to expect any desulphurization in this way before the bath and the slag have become well deoxidized. Thus, before any sulphur can be removed, all the more easily reducible oxides, as phosphoric acid, ferrous and manganese oxides, must be reduced. After this has been effected the removal of sulphur probably takes place in the following manner:

The desulphurizing slag, which mainly consists of lime and fluorspar, must not be allowed during deoxidation to enrich itself too much in SiO_2 , so as to maintain its tendency to increase further its content of this acid constituent. That tendency is so strong that, if the steel contains any silicon, some calcium is even reduced from calcium oxide, the oxygen combining with the silicon, and the calcium robbing the sulphides in the metal of their sulphur, according to the following reaction:



It is, however, also possible that the fluorspar in the slag to some extent acts as a desulphurizer,



The silicon fluoride, being a gas, escapes from the furnace.

From experiences with an arc furnace the author has found that even with a perfectly deoxidized white and falling slag it may happen that no elimination of sulphur takes place, or that at any rate it takes place very slowly.

In all such cases it was found that the slag was very high in silica through drippings from the roof of silica bricks. The probable explanation is that with too high a percentage of SiO_2 the slag has no desire to increase this percentage by giving up some of the oxygen combined with calcium, and the calcium not being liberated it cannot combine with the sulphur.

Combinations of Electric Furnaces with Others

In considering the combinations of the electric furnace with pre-melting furnaces, the aim should be to make such dispositions as to utilize the specific advantages of the different furnaces as fully as possible. Therefore all oxidizing reactions should, as far as possible, be carried out in the oxidizing furnace, and the electric furnace should mainly be used for desulphurization, deoxidation and alloying, or for such reactions as require a reducing or neutral atmosphere. The electric furnace may also with great advantage be used for raising the temperature of the steel from that necessary for the oxidizing reactions, up to tapping temperature. This is especially the case when the electric furnace is operating in combination with an open-hearth furnace. The efficiency of the electric furnace is not very much influenced by the temperature of the metal. A 20-ton single-ring furnace has, for instance, a maximum efficiency of 81 per cent. at 1500 deg. C. and of 78.8 per cent. at 1600 deg. C., thus a very small reduction.

In an open-hearth furnace the conditions are very different, because of the fact that the useful heat has to be transferred from the gases to the steel. With increasing temperature of the steel the transfer of heat becomes less, and finally becomes nil, when the difference of temperature between the gases and the steel has become so low as to allow only so much heat to be transmitted as is necessary to cover the radiation losses from the bottom of the surface. At this stage the efficiency of the furnace is zero. This question of the efficiency of the open-hearth furnace is of considerable importance for the appreciation of the possibilities of the electric furnace, but so far as the author knows, no complete study of the open-hearth furnace with regard to its efficiency during various stages has ever been published.

Comparison of Costs

To bring out the economical possibilities of the combination of the induction furnace with an open-hearth furnace, the costs of treatment may be compared in a general way as follows:

Assuming an open-hearth steel, costing 16s. per ton to produce by the usual open-hearth process requiring eight hours, and assuming that a treatment is adopted by which the steel is transferred to an electric furnace after 5.5 hr. for the final treatment: The costs in the open-hearth furnace will then be reduced from 16s. to $5.5 \div 8 \times 16 = 11s.$ per ton. The cost of the treatment in a 25-ton Frick furnace, operating in connection with three or four open-hearth furnaces of the same capacity, will in case of cheap current from blast-furnace gas be about 7s. per ton, including the costs for the ladle for the transfer of the steel to the electric furnace, slag additions for desulphurization, deoxidizers, lining, labor, and royalty.

The total costs of production by the combined process would thus be only 2s. per ton higher than by the ordinary open-hearth process, and considering that such steel has been desulphurized and thoroughly deoxidized in the electric furnace, an increase of 2s. per ton must be considered low, and the process ought to find a wide application for certain purposes.

Although the electric furnace undoubtedly will come into extensive use in combination with open-hearth furnaces, its importance will, however, be much greater to the present Bessemer acid and basic processes. In districts rich in ores suitable for acid or basic working, it is probable that the open-hearth furnace will soon totally disappear, as the electric steel can be produced at a price equal to or less than that of open-hearth steel, and of higher quality.

The difference in cost of production between Bessemer acid and basic steel may be said to vary between 6s. and 12s. per ton. The electric treatment in the induction furnace costs from 5s. to 8s., or possibly 10s., per ton, according to the amount of refining wanted, the size of the plant, etc.

Melting Ferromanganese

The advantages of using liquid instead of cold ferromanganese are mainly: quicker and more reliable deoxidation, greater uniformity in the composition of the steel, avoidance of hard spots in the ingots due to undissolved FeMn, and thus higher quality, greater security that all FeMn is absorbed by the steel, and thus less loss, which in the case of FeMn in lumps may become considerable through some of it getting stuck in the slag. The advantage of the electric furnace for the melting of ferromanganese over other furnaces is again based on its non-oxidizing atmosphere, thus avoiding loss of metal.

New Data on Iron Ore Values

The second edition of the Iron Ore Manual is now being prepared for publication by the author, Rukard Hurd, secretary of the Minnesota Tax Commission, St. Paul. The new edition will have a special interest because of the author's investigations into ore values and phosphorus limits. The tabulated results of these studies are expected to present some facts bearing upon ore calculations not previously recognized. Among the features of the new edition will be the following:

1. An appraisal of developed Lake Superior iron ore, per ton, in the ground, according to the range or mining district, and the per cent. of natural iron content between 45 and 65 per cent. This will be presented in such a way that the value in the ground of any other iron ore that has a market price may be determined for capitalization or any other appraisal purpose.
2. A table of furnace weights of ore required per ton of pig iron produced, for ore between 40 and 70 per cent., dry, and for all grades of pig iron, based on a reckoning of conversion losses.
3. A table of costs for smelting the gangue in ore, between 40 and 70 per cent., for all grades of pig iron per ton.
4. Bessemer ores defined, with maximum phosphorus limit allowable for ores between 40 and 70 per cent. dry analysis.
5. Assembling cost of pig iron at various locations, with relationship to pig-iron freights.
6. Comparative efficiencies of the iron ores of the world now being mined.
7. Natural territories tributary to various ore fields and competing points.
8. A revision of the data covering the beneficiation of ores of the world.

A Colossal British Employers' Defense Fund.—According to the London Times, an association of British employers is being formed to maintain "their rights and their freedom to bargain individually with free workers or collectively with trade unions." It is to be known as the United Kingdom Employers' Defense Union, will be registered as a trade union, and is to have guarantees from the members, commensurate with their commercial position, to aggregate \$250,000,000. This guarantee fund will defend members against interference of outside organizations, uphold the inviolability of contracts, and, when strikes are forced on them, prevent workmen from being intimidated by members of trade unions or other kindred organizations. Registration as a trade union is necessary to insure enjoyment of the privileges accorded by British laws to workmen's unions.

The Columbia Steel Company, San Francisco, gives the following as the average chemical composition of eight consecutive heats from its open-hearth furnace at Pittsburgh, Cal.: Silicon, 0.35 per cent.; sulphur, 0.028 per cent.; phosphorus, 0.005 per cent.; manganese, 0.74 per cent.; carbon, 0.21 per cent. The physical characteristics of seven heats of the above composition are given as follows: Ultimate strength, 62,470 lb. per sq. in.; elastic limit, 34,430 lb. per sq. in.; elongation in 2 in., 34.5 per cent.; reduction of area, 62.8 per cent.

A total money loss of \$163,000,000 was caused by the floods of the Ohio Valley last March, so the Weather Bureau estimates. The loss of prospective crops alone was \$11,000,000. Of the total loss, more than 70 per cent. was sustained in Ohio and Indiana.

The Second Annual Congress for Safety

Remarkable Growth of a New Organization —The Round-table Discussions a Feature

The second Safety Congress of the National Council for Industrial Safety was held at the Hotel McAlpin, New York, September 22 to 25. The attendance was large and enthusiastic, amounting to about 200. Many of the safety men of some of the largest industrial and railroad corporations of the country were present and took active part. The interest in the entire convention is evidence of the hold that this subject has already secured upon the industrial and manufacturing interests of the country in its business as well as humanitarian phase.

The first session, the educational, was opened at 10 o'clock Tuesday morning, September 23, with Arthur Williams, of the American Museum of Safety, presiding. H. L. Brownell, safety inspector of Chicago, Ill., exhibited interesting motion pictures in which nearly every kind of street car and automobile accident was shown, representing 50 per cent. of those occurring in Chicago. The pictures are to be used in a fall and winter campaign among the 400,000 school children of that city. The extent to which motion pictures are being used in an educational way was repeatedly brought out at the various meetings. Several participants identified with the iron and steel industry stated that it was now a part of their regular campaign to educate employees in the principles of safety by regular exhibitions of motion pictures illustrating accidents and their prevention.

At the meeting devoted to organized safety, Wednesday morning, September 24, Dr. Charles P. Niel, ex-United States labor commissioner, was the principal speaker. The keynote of his remarks was to the effect that only by organization could the owners and employers of great establishments be interested and not until they were enlisted could the work of accident prevention progress.

The principal meeting of the congress was held Wednesday afternoon at 2 o'clock, at which James T. McCleary, secretary of the American Iron and Steel Institute, presided. Dr. Lucius W. Chaney, of the United States Bureau of Labor, discussed "Safety as Promoted by Various Bureaus," and C. W. Price, assistant to the Wisconsin Industrial Commission, spoke on "Safety as Insured by State Bureaus," stating that accidents in industrial establishments had decreased 26 per cent. last year in Wisconsin, owing to the active work of the commission. R. C. Richards, chairman of the safety department of the Chicago & Northwestern Railroad, spoke on "Safety in Transportation" and outlined the extensive and systematic safety committee work of his organization, which had resulted in a very large reduction in accidents and consequent greater efficiency from all employees and increased profits for the company. "Safety and Welfare in the Iron and Steel Industry" was discussed by L. H. Burnett, of the Carnegie Steel Company. He laid emphasis on the importance of the campaign for safety as a business proposition and stated that all the points that have been brought out by various speakers were as applicable to the steel industry as to any other. He dwelt on the importance of neatness around a mill and the beneficial effect of flower beds, but above all he said that the workmen must be instructed and interested, as in the steel industry over 70 per cent. of the accidents were those of the ordinary class of labor.

A leading and unique feature was the round-table discussions held each morning of the congress at 8:30. They were well attended and ideas as to safety were informally exchanged. They were presided over by C. W. Price. At the first round-table meeting on Tuesday morning the topic was "How to Reach the Employer." It was brought out that unless the owners were convinced of the economic value of safety work, further effort was useless. The subject for the second meeting was "How to Reach the Foreman." It was the experience of those present that the best campaign consisted in a banquet and entertainment given by the employer to the foremen at which the plans for a safety campaign were outlined and where the earnestness of the intent of the employer was emphasized. At the third round-table meeting the question of "How to Reach the Workmen" was discussed. It was emphasized that unless the workmen were impressed with the benefit which would accrue to themselves, campaigns for safety

would be useless, and that an effective way to reach the men was through the foremen, who are often rewarded with bonuses or prizes. The enthusiasm and interest in these meetings were significant and the fact that a good attendance was secured at such an early morning hour was remarked upon.

On Wednesday at 8 p. m. a banquet was held at the McAlpin Hotel in conjunction with the Association of Iron and Steel Electrical Engineers. Governor John K. Tener, of Pennsylvania, was toastmaster. The National Council for Industrial Safety announced the election of R. W. Campbell, of Chicago, as president, and H. W. Cameron, manager casualty department of the American Steel Foundries, Chicago, as secretary and treasurer.

Iron and Steel Electrical Engineers

In an adjoining room the Association of Iron and Steel Electrical Engineers held its seventh annual convention contemporaneously with the National Council for Industrial Safety. It was well attended, the reason for the simultaneous meetings being that the safety congress is an outgrowth of the former, the first general safety meeting having been held last year in Milwaukee, Wis., under the auspices of the older organization. Various interesting papers of immediate interest to iron and steel electrical engineers were read and discussed. The officers for next year were announced as follows: E. Friedlaender, Carnegie Steel Company, Braddock, Pa., president; O. R. Jones, Youngstown Sheet & Tube Company, Youngstown, Ohio, vice-president; W. T. Snyder, National Tube Company, Pittsburgh, secretary; and James Farrington, La Belle Iron Works, Steubenville, Ohio, treasurer.

The Virginia Iron, Coal & Coke Company's Year

The Virginia Iron, Coal & Coke Company has issued its report of operations for the year ended June 30, 1913, showing that the financial results of that year were much better than for the year previous. The income account compares as follows:

	1913	1912
Gross earnings.....	\$4,331,263	\$2,893,214
Expenses.....	3,749,433	2,614,697
Net earnings.....	581,830	278,517
Other income.....	35,067	33,642
Total.....	616,897	312,159
Taxes, depreciation, etc.....	634,988	685,199
Deficit.....	\$38,091	\$373,040

Operating accounts were charged in 1912-1913 with funds for depreciation, etc., as follows: Depreciation of coal lands, \$100,708; depreciation of ore lands, \$3749; depreciation of owned property, \$151,064; depreciation of leased property, \$62,771; fund for furnace repairs, \$33,347; making a total of \$351,639. During the year \$259,358 was expended for improvements, including \$109,855 for blast-furnace repairs. President John B. Newton, in his accompanying remarks to stockholders, says, in part, as follows:

"Although the fiscal year just ended started out full of encouragement for the iron industry, by the expiration of the first six months the demand for iron had fallen off, prices had dropped and continued to drop until, in May, the low level of 1911 was reached. The market remained very weak through the months of June and July, and while today it is by no means strong, there is a better feeling, and indications point to more demand and better prices. During the few months of activity in the market, the company succeeded in booking sales of 230,000 tons of iron, at fairly remunerative prices.

"The plants and equipment of the company have been fully maintained, and in my judgment the general condition of the company is better than ever before in its history."

It is understood that the company heavily reduced its large stock of pig iron during the year, having on hand June 30, 1913, less than 60,000 tons, against nearly 150,000 tons June 30, 1912.

The Wellman-Seaver-Morgan Company, Cleveland, Ohio, has received an order from the Pennsylvania Railroad Company for two steam-operated car dumpers. One of these will be erected in Cleveland and the other in Sandusky, Ohio.

Reduction of Titaniferous Iron Ores

The Electric Furnace Holds Out New Hope
—Two Large Deposits That Are Workable

The Bureau of Mines, Washington, D. C., has just issued Bulletin No. 64, entitled "The Titaniferous Iron Ores of the United States, Their Composition and Economic Value," by Joseph T. Singewald, Jr. Mr. Singewald was authorized to study in detail the physical structure and chemical composition of the ores as bearing on the problem of their utilization, with especial attention to the possibility of using titaniferous ores at a profit with present methods and under existing conditions. The investigation embraced two principal lines, elimination of the titanium from the ores so as to make possible their smelting in the usual way and the devising of a method of smelting by which such ores may be reduced as economically as regular ones. An important part of the research was metallographic; in this way the physical constitution of the ores was ascertained and on it many important conclusions are based. The bulletin contains numerous interesting photomicrographs. Complete data of all the important titaniferous deposits in this country are given. The results of his valuable investigation are thus given in the author's résumé:

"The evolution of the modern blast furnace has taken place in such a direction as to make the utilization of titaniferous iron ores impracticable. Notwithstanding numerous experiments that have been conducted with a view to discovering a furnace charge that will make the use of these ores practicable from the standpoint of furnace operation and economy, there is today no hopeful feeling in regard to the possibilities of smelting these ores in the blast furnace. On the other hand, the introduction of the electric furnace holds out a new hope for the direct reduction of the titaniferous ores.

"The results of magnetic-separation experiments conducted with these ores are very promising in some cases and extremely disappointing in others. No rule of general application can be formulated as to the behavior of the ores. Some deposits are very amenable to magnetic separation, and yield concentrates that require the admixture of only a small proportion of nontitaniferous ores to make a satisfactory ore mixture. Other deposits are less amenable and yield concentrates that would have to be mixed with three or four parts of nontitaniferous ores for furnace use. There are many other deposits in which the percentage of titanium separable in this way is extremely small, so that the utilization of such ores seems to depend on the discovery of a process that will make their use feasible.

"The cause of the difference in behavior of the ores toward magnetic separation is revealed in their microstructure which is readily studied by the metallographic method. This method of investigation shows that the titanium occurs in these ores in the form of ilmenite grains in about the same order of magnitude as the magnetite grains, as ilmenite inclusions and intergrowths of microscopic size in the magnetite, and as an integral part of the magnetite molecule itself. The titanium occurring in the first form, as ilmenite grains, is readily separable by means of magnetic concentration, except in the finest grained ores with which the degree of crushing required would make such concentration impracticable. The titanium occurring in the two latter forms is inseparable by mechanical means. The percentage of titanium occurring in these different forms varies greatly in the different ores, and consequently every case must be tested for itself. A metallographic study of the ores of any deposit will at once decide the question of the amenability of the deposit to magnetic separation.

"As regards chemical composition, except for their titanium content, the ores are very desirable. The coarser-grained ores are usually high grade in their natural condition, whereas a magnetic separation of the leaner ores yields a high-grade concentrate, with the deleterious constituents at a minimum.

"As the iron industry at present demands large deposits of definite extent, the outlook for most of the deposits of titaniferous iron ore in the United States is not promising. As a rule the deposits are relatively small and of irregular extent and distribution. Further, they are lean to medium grade, and inaccessibly situated as regards transportation facilities. In other words, to put the deposits on a pro-

ducing basis would require a heavy initial outlay of capital, which the size and irregularity of occurrence does not warrant. There are, however, the two large, high-grade deposits of Sanford Hill, N. Y. [described in *The Iron Age* of October 14, 1909, p. 1243], and Iron Mountain, Wyoming, which are so readily workable that, despite their titaniferous character, their utilization within a few years seems certain."

Valley Pig-Iron Averages for September.—W. P. Snyder & Co., Pittsburgh, report the average price of Bessemer iron in September to have been \$15.75 and basic \$14.13 $\frac{3}{4}$, both at Valley furnace. These prices are based on reported sales of 15,000 tons of Bessemer and about 4000 tons of basic. The reported sale of 1000 tons of basic at \$14.25, Valley furnace, partly explains the higher average price for basic. The average price of Bessemer iron in August was given by W. P. Snyder & Co. as \$15.657 and of basic \$14.04 $\frac{1}{2}$. Thus the Bessemer average for September is nearly 10c. higher than for August and the basic average price about 9c. higher.

Conversion Transaction in Pig Iron.—PITTSBURGH, October 1, 1913. (By Telegraph.)—The Brier Hill Steel Company, Youngstown, Ohio, has sold 5000 tons of basic and 5000 tons of Bessemer pig iron to the Republic Iron & Steel Company for prompt delivery, but takes sheet bars in payment for the iron so that the transaction is really a trade of pig iron for sheet bars which will be used in the sheet mills of the Brier Hill Steel Company at Niles.

At a recent meeting of the stockholders and directors of the A. O. Smith Company, Milwaukee, Wis., L. R. Smith, son of the late A. O. Smith, was elected president and general manager, succeeding his father. He has been connected with the business since its inception. Other officers chosen were as follows: C. S. Smith, vice-president; E. M. Smith, secretary; James L. Sinyard, treasurer and manager of sales. In addition to these the board of directors includes John P. Kelly. The policy of the company will continue unchanged under the new management.

The property of the Hecla Iron & Mining Company was sold at receiver's sale at Ironton, Ohio, September 22. It was appraised at \$110,000 and was bid in by J. L. Anderson, the largest creditor, for \$85,000. The property comprises 6000 acres in fee, 7000 acres in mineral rights, 80 houses and the Hecla furnace of ante-bellum days. The property was originally owned by John Campbell, founder of Ironton, and up to the sale above reported was in the hands of his heirs.

The William Cramp Ship & Engine Building Company, Philadelphia, Pa., launched September 18 the steamship Cecilia, building for W. R. Grace & Co. The vessel is 420 ft. long, will have a gross register of 10,000 tons and will be used in the Panama Canal trade.

The Standard Smelting & Refining Company, Cleveland, Ohio, has been organized to manufacture tin, solder, terne and babbitt metal. It will make a specialty of dip tinning. Its plant is located at 2365-2379 Canal road. A. J. Miller is the manager.

The Parry Corporation, Oneida, N. Y. has been incorporated to deal in iron and steel by W. B. and H. B. Parry, 12 Seymour street, Utica, N. Y., and F. D. Parry, New York City. The capitalization of the company is \$30,000.

The Reading Railroad has ordered 55 all-steel passenger cars at a cost of about \$14,000 each. The Pennsylvania Railroad is reported to be figuring on 100 locomotives and the Chicago & Northwestern on 40.

Buena Vista furnace of the Alleghany Ore & Iron Company, Buena Vista, Va., was blown out last week for relining.

Autumn Steel Meeting at Chicago

Programme of the American Iron and Steel Institute for October 24

The directors of the American Iron and Steel Institute at a meeting in New York, September 26, definitely fixed October 24 and 25 as the dates for the autumn meeting at Chicago. Friday, October 24, will be devoted to the reading and discussion of papers, and Saturday to visiting plants in the Chicago district. A programme of unusual importance has been prepared, the participants being particularly well equipped to present their respective topics. The list is as follows:

"Fuel Possibilities in Steel Making," by William Whigham, assistant to president Carnegie Steel Company, Pittsburgh.

Discussion by W. G. Kranz, general manager National Malleable Castings Company, Sharon, Pa.

"Treatment of Blast Furnace Flue Dust," by Eugene B. Clark, vice-president and general manager American Sintering Company, Chicago.

Discussion by John W. Dougherty, president Pittsburgh Crucible Steel Company, Pittsburgh.

"The Use of Refractories in the Iron and Steel Industry," by H. W. Croft, president Harbison-Walker Refractories Company, Pittsburgh.

Discussion by William C. Coffin, structural engineer Jones & Laughlin Steel Company, Pittsburgh.

"Extras—The Reason and Necessity Therefor," by J. L. Replogle, vice-president Cambria Steel Company, Johnstown, Pa.

Discussion by Henry P. Bope, first vice-president Carnegie Steel Company, Pittsburgh; John L. Haines, assistant to vice-president Jones & Laughlin Steel Company, Pittsburgh; Chas. R. Robinson, general manager of sales Lackawanna Steel Company, Buffalo.

"Progress in Roll Design," by T. H. Mathias, assistant superintendent Lackawanna Steel Company, Buffalo.

Discussion by Harry L. James, superintendent roll department American Bridge Company, Pencoyd, Pa.

"Vocational Education," by Theodore W. Robinson, vice-president Illinois Steel Company, Chicago.

Discussion by Stephen W. Tener, manager accident and pension department American Steel & Wire Company, Cleveland.

"Steel Works Practice in the United States," by Thomas J. Bray, president Republic Iron & Steel Company, Youngstown, Ohio.

"The History and Problems of the Steel Wheel," by John C. Neale, structural engineer Carnegie Steel Company, Pittsburgh.

Discussion by D. F. Crawford, general superintendent of motive power, Pennsylvania Lines West, Pittsburgh.

Secretary James T. McCleary announces the election of the following as members of the institute at the directors' meeting of September 26:

Edwin A. Amaden, general superintendent Waverly warehouses, Carnegie Steel Company, Newark, N. J.

S. H. Ankeney, Engineering Record, New York.

W. H. Baltzell, chief engineer Pittsburgh Crucible Steel Company, Midland, Pa.

Gordon Battelle, 2d, assistant in sales department Columbus Iron & Steel Company, Columbus, Ohio.

Ross J. Beatty, vice-president Inland Steel Company, Chicago.

Frank T. Bentley, traffic manager Illinois Steel Company, Chicago.

E. J. Block, assistant secretary and treasurer Inland Steel Company, Chicago.

Charles A. Boyd, manager works Wellman-Seaver-Morgan Company, Cleveland.

N. G. Brayer, assistant superintendent National Malleable Castings Company, Sharon, Pa.

J. J. Brooks, Jr., general sales manager Harbison-Walker Refractories Company, Pittsburgh.

Emmett B. Carter, chief engineer Midvale Steel Company, Philadelphia.

Frederick Connell, sales agent American Steel & Wire Company, New York.

Perry T. Coons, sales agent American Steel & Wire Company, New York.

John Crawford, Jr., manager Noble Electric Steel Company, Heroult, Cal.

H. W. Croft, president Harbison-Walker Refractories Company, Pittsburgh.

Charles C. Davis, president Pennsylvania Forge Company, Bridesburg, Philadelphia.

Robert J. Davis, operating manager Eastern Division American Bridge Company, Philadelphia.

Thomas K. Glenn, president Atlanta Steel Company, Atlanta, Ga.

Herbert C. Greer, president Preston County Coke Company, Morgantown, W. Va.

Charles M. Gunn, president Columbia Steel Company, San Francisco, Cal.

R. S. Hall, vice-president Bourne-Fuller Company, Cleveland.

Herbert T. Hecht, superintendent Montour Rolling Mill, Reading Iron Company, Danville, Pa.

J. J. Hendricksen, secretary and treasurer Tod-Stamlaugh Company, Cleveland.

Charles E. Hermann, acting general manager Moose Mountain, Ltd., New York.

John Hulst, chief mechanical engineer Carnegie Steel Company, Pittsburgh.

B. Edwin Hutchinson, vice-president Blair Engineering Company, New York.

Harry L. James, superintendent roll department Pencoyd plant American Bridge Company, Pencoyd, Pa.

W. E. Jewell, superintendent rolling mills Inland Steel Company, Indiana Harbor, Ind.

George H. Jones, vice-president Inland Steel Company, Chicago.

Harry L. Kaufman, managing partner E. N. Breitung & Co., Cleveland.

Joseph P. Kittredge, superintendent National Malleable Castings Company, Sharon, Pa.

William G. Kranz, manager National Malleable Castings Company, Sharon, Pa.

J. E. Lewis, vice-president Harbison-Walker Refractories Company, Pittsburgh.

Charles Major, manager mill department Pencoyd plant, American Bridge Company, Pencoyd, Pa.

Stephen T. Major, manager bridge department Pencoyd plant, American Bridge Company, Pencoyd, Pa.

Charles B. Murray, chemist and metallurgist, Cleveland.

William Pigott, vice-president Pacific Coast Steel Company, Seattle, Wash.

Robert Radford, acting president Standard Steel Works Company, Philadelphia.

Albert Reichman, division engineer Western division, American Bridge Company, Chicago.

R. S. Rider, manager Canadian Steel & Wire Company, Hamilton, Ont.

Spencer S. Rumsey, chief engineer Oliver Iron Mining Company, Duluth, Minn.

Willard N. Sawyer, president Wellman-Seaver-Morgan Company, Cleveland.

James N. Sherer, Central Iron & Steel Company, Harrisburg, Pa.

Albert E. Smith, operating manager Western division American Bridge Company, Chicago.

Stephen W. Tener, manager accident and pension department, American Steel & Wire Company, Cleveland.

W. B. Topping, manager sales Philadelphia district, Republic Iron & Steel Company, Philadelphia.

Francis J. Webb, general manager Northern Ore Mines, Republic Iron & Steel Company, Duluth, Minn.

Carl A. Wendell, engineer Illinois Steel Company, Joliet, Ill.

H. T. Whigham, foreign manager United States Steel Products Company, London, Eng.

Steel Corporation Suit on Again

Hearings in the Government suit for the dissolution of the United States Steel Corporation were resumed at 71 Broadway, New York City, on Wednesday, October 1. The suit was filed October 26, 1911, and hearings began the following spring. When they were adjourned for the summer, last June, the Government had completed its direct case and several witnesses had testified for the defense, including President James A. Farrell and Chairman E. H. Gary.

The testimony to be introduced in the next two or three weeks will be directed to disproving the Government's allegation that the Steel Corporation had effected a substantial monopoly of the ore deposits of the country. A number of ore experts will be called to show that even in the Lake Superior district, where the corporation's proportion of ore holdings is the largest, it has never had a monopoly. Experts will also testify that the corporation obtained nothing approaching an ore monopoly in the Alabama-Tennessee district by the much-mooted acquisition of the Tennessee Coal, Iron & Railroad Company, and that in various parts of the country there are large deposits of commercially available ore with which the Steel Corporation has nothing to do. The testimony will go to show that deposits of iron ore are so extensive that their monopolization is almost inconceivable, South America having large available supplies, practically untouched.

The use of pulverized coal in metallurgical furnaces was discussed before the Engineers' Society of Western Pennsylvania, Pittsburgh, September 30. A paper on the subject was presented by James Lord, president American Iron & Steel Manufacturing Company, Lebanon, Pa. Over 100 puddling and heating furnaces of the works are equipped for using the powdered coal and it is intended to apply the system to open-hearth furnaces.

For Less Smoke in Boiler Operation*

Why Co-operation Is Needed in Standardizing Installations of Boilers

Installations are being made to-day that do not follow the principles that are commonly known to be right for the abatement of smoke. One frequently hears that boilers cannot be set higher because the contract for the masonry work has been included with the boilers; or, that the contract has already been let and the purchaser will not pay the extra cost of setting the boilers the way they should be set with the particular stoker selected. Again, we frequently hear that the boilers cannot be set right because the architect has previously provided so much room for the boiler and stoker and they must go within the limit provided, whether a good combination or a bad one is obtained. There is another phase of this problem that seems at the present to interfere with obtaining good installations, that is, the cost of the installation. Of course, boilers being raised, stokers extended, higher stacks, etc., cost more money.

A case is recalled where the contract had been closed for boilers, stokers and brickwork. The setting did not agree with what the smoke inspector thought was right and he took a firm stand that the boiler should be raised. If the purchaser, the boiler and stoker manufacturers and the smoke inspector, in this case, had cooperated and definitely decided the points involved, enough money would have been expended to obtain the right kind of a combination. The smoke inspector did the right thing in holding out for the correct height of boiler setting. What is required is for everyone to take a firmer stand and hold out for those things that are known to be essential for a good combination of boilers and stokers.

Organization Investigations Suggested

What is needed is an organization that has for its object the diffusion of information and data on installations made to burn bituminous coal without smoke. Committees should be appointed to investigate and analyze installations of all kinds in all territories. For example, a committee consisting of members who live in the vicinity of Cleveland could take four or five different kinds of combinations in that locality from the time that they are installed and report to the organization everything that entered into the construction and design. Drawings and data could be presented that would determine just exactly what the particular installation would do in the abatement of smoke. It would not be necessary to take any particular type of boiler, or any particular type of stoker. There are not so many kinds of stokers and boilers but what reports could be made on all of the different combinations.

It would seem that each community where coal conditions are about the same should obtain their own data. The time has not come when a combination can be standardized in the West and be adapted to the conditions in the East, or vice versa, with success. There should be, however, one society from which all the data would emanate.

A Case of Lack of Co-operation

Smoke abatement cannot be expected as long as operating conditions exist as in the following plant operated 24 hr. a day, having six water-tube boilers, each of 250 hp. rated capacity. The boilers were served by one stack, 9 ft. in diameter by 150 ft. high. There was one long breeching connecting all the boilers. A short breeching connected the main breeching to the stack. The complaints were: excessive labor and great difficulty in maintaining the steam pressure necessary to operate the plant. Considerable money was spent in sending engineers to the plant with instructions to assist in every possible way to better the operating conditions. It was immediately found that the draft available in each furnace was low and insufficient to burn the coal required. Arrangements were made to analyze this draft condition carefully and find the cause of the troubles.

There was an available draft in the stack of about 0.90 in., and in the short breeching, about 0.83 in. At points in the main breeching, however, only a few feet away, the draft dropped to about 0.53 in., indicating a loss of 0.3 in. draft in the right angle turn to the main breeching.

The investigating engineers reported the boilers dirty and on several occasions 3/16-in. scale was removed from the tubes. It was also found that the boilers were only cleaned every six months and the soot blown from the tubes every week. There was a heater installed and owing to the piping construction it could only be cleaned once a year. An inspection of the blowoff valves of the boiler proved that they all leaked.

In this particular case, the purchaser was at fault in not operating the plant properly and maintaining the equipment in good condition. Whoever put the breeching in was responsible for its faulty design. The stoker manufacturer was at fault if he knew of the breeching design, he should have cautioned the purchaser regarding draft losses. The smoke inspector was not at fault, because the city where the plant was located did not have a smoke ordinance and consequently no smoke inspector.

A peculiar situation arose in analyzing the conditions of this plant. The owner's operating engineer reported the boilers free from scale. The investigating engineer reported the boilers badly scaled. It was finally necessary to have the manager of the company personally inspect the boiler on which reports were being made. In his personal investigation small spots of scale in the tubes were noted which the turbine had skipped. The operating engineer claimed that this was a trivial matter. The manager, however, insisted on having all of the scale removed. This was done and five wheelbarrow loads of scale were removed from this one boiler, this scale being removed after the owner's operating engineer had reported the boiler clean.

An Example of Conditions Which Must Be Met

A few years ago the stoker manufacturer had very little control over the things that determined whether a stoker installation would be a success. As an example of this, a combination installed last year is taken, where the stoker manufacturer inquired as to the height of stack selected for the 500-hp. boiler to obtain the 16-in. draft specified for the furnace. He was told by the architect that the stack would be 100 ft. above the grates. The stoker manufacturer claimed that 100 ft. was not enough and insisted on 150 ft. The architect was greatly astonished that such a height for this one boiler was necessary; he finally agreed, however, to make it 125 ft. The stoker manufacturer still insisted that a 125-ft. stack was not sufficient and nothing less than 150 ft. would do. Everything possible was done to convince the architect that this size stack was needed. It was finally decided, however, to build the 125-ft. stack, the purchaser approving the architect's opinion. The stack was built and sufficient draft was not obtained for the amount of coal it was necessary to burn; consequently the installation was a failure.

If all points are settled on a good engineering basis, there will be no question but the best combination known will be obtained and the customer can well afford to expend the money necessary for it. A few years of this practice of buying stokers and boilers will prove its effectiveness in abating smoke.

The Right Sort of Procedure

One case is recalled where the purchaser decided on the boiler and stoker that he had in mind purchasing; he then called the boiler manufacturer, the stoker manufacturer and his consulting engineer who was designing the breeching, stacks, etc., in conference with him. He made the statement that he wanted the best combination of this type of boiler and stoker that he could get and wanted all conditions right for its proper operation. At this meeting the size of the stack was decided on, the setting of the stoker in combination with the boiler was arranged, the grade of firebrick that was to be used in the arches was selected; in fact, all matter, even to the minutest detail pertaining to this combination, was discussed and decided on. After it was thoroughly understood between those present that in their opinion no

*From a paper presented to the International Association for the Prevention of Smoke, Pittsburgh, September 10, 11 and 12, by Joseph G. Worker, Roney Stoker Department, Westinghouse Machine Company, Pittsburgh.

changes could be made, from those decided, that would better the installation, the purchaser signed the contracts.

The stoker manufacturer must take a firm stand for the proper setting of the stoker; he must hold out for the draft that is required to burn the coal and he must insist on the proper operation of the stokers. The boiler manufacturer must provide ample damper areas and gas passages so there will be no restriction to the flow of gases through the boiler to the breeching. If these areas must be changed to suit local conditions, then the boiler manufacturer should advise the purchaser how they should be changed. The boiler manufacturer must also provide easy means for removing the soot from the boiler tubes and baffles; and he must arrange to set the boiler according to the requirements of the particular stoker in combination.

Value of Motor Drive for Main Rolls

Arguments for the Electric Operation of the Steel Mill

At the recent meeting of the Association of Iron and Steel Electrical Engineers in New York City, E. Friedlaender, Carnegie Steel Company, Braddock, Pa., presented a paper on the motor drive for the main rolls of a steel mill. It was in part as follows:

Electric drive has increased the capacity of mills on account of better control of rolling operations, higher speed range in reversing mills and greater overload capacity of the electric drive for short periods. Very few of our men realize how much the average speed of an engine-driven mill runs below the normal or rated engine speed, therefore since the speed of the motor is practically constant there must necessarily be an increased output from motor-driven mills over that of engine-driven mills, unless the engine is of much greater capacity than is usually supplied. Also the constant angular velocity of a motor greatly reduces the liability of breakage of spindles, couplings, boxes, etc., and even the general wear and tear of the roll-train. This is evidenced by the smaller amount of breakages shown with motor-driven mills. So far, at least, the motor has shown itself to be more reliable, requires less attention, maintenance, repairs and lubrication than the steam engine.

How Bad Conditions Are Indicated

One of the greatest advantages of motors over engines lies in the ease of measuring power required to roll. In the case of an engine-driven mill, the roll-turner and roller usually concern themselves only with the section and output, caring nothing whatever about the friction load of the train or the power required to make the reductions, just as long as the engine will pull the mill, and should the engine stall or slow down, the fault is usually laid to it or to low steam pressure. With the motor drive both the friction load and the power requirements of the various passes can be so simply determined that all necessary losses can easily be located and eliminated.

In one instance, a new mill was set up and adjusted in accordance with the usual practice and the friction load was found to exceed the full load capacity of the motor. After adjustment the average load of this mill during operation was found to be less than the friction load as the mill was originally set up. In another instance the total load of a single pass, including friction and reduction, was decreased 66 2/3 per cent. by the proper adjustment of the roll bearings, and in still another case the reduction load was decreased 25 per cent. by a very slight change in the shape of the pass. In one of the large motor-driven mills, by paying careful attention to the friction load, the design of the pass, and shutting down the motors when the mill was not working, the average consumption of power per ton of output was decreased 37.8 per cent. While this actual saving in power consumption is well worthy of consideration, it is really but a comparatively small amount of the total saving resulting from less lubricants, less wear of bearings, spindles, boxes and necks, less roll dressing and consequent trouble, and in the reduction in time lost from shutdowns.

Influence on Roll Design

The electric roll drive has also taught us how to get the best relation among rotating masses, speed, time and

horsepower. It has helped the roll designer to calibrate rolls in such a manner that the power characteristic for all the passes is uniform, thereby avoiding high power peaks, decreasing the size of the prime-mover, and reducing first cost and fuel consumption.

The watt-hour meter warns the roller that bearings or rolls are becoming tight and hot, or that steel is causing excessive friction in the passes, often due to overfilling, cold steel or faulty calibration, thereby guarding against damage to the rolls and bearings. The meter indicates that lower heat, greater elongation, and especially change of profile in different directions, increase the power required at the rolls much more rapidly than do chemical hardness, high tensile strength, or larger drafts. The meter also shows that it is not the higher percentage of carbon in steel which requires more power in rolling, but the lower temperatures at which this steel has to be rolled, and also that an increase in width of the steel shape requires more power than a decrease in height. By means of the meter, too, it can readily be seen that rolling squares and rounds takes per square inch displacement much less power than that of shapes with large peripheries and many flanges, as the latter cool off quickly and cause much friction in the rolls.

One Objectionable Feature, the Large Power Plant

The total motive power required in a steel plant is changeable and fluctuates continuously, the average in many plants being often below one-fourth of the total horsepower installed in motors. The electric-driven rolling mills will, however, demand considerably larger power stations to take care of the large currents, especially when all the motors happen to be overloaded at one time, as for instance when rolling cold steel. It is very important to find out beforehand how much of this fluctuating load the power house may have to supply, assuming the worst conditions, as the shutdown of the electric power station for even a very short time will stop the operation of a large number of machines and cause enormous losses. This is the one very objectionable feature of making a great number of prime movers entirely dependent on one power station, and, therefore, some means should be taken to prevent this disturbance.

The Canadian-Vickers Shipyard at Montreal

Principally through the determination of the people of the Dominion of Canada to ultimately possess a navy under their own control, the opportunity of establishing a modern shipyard in Canada, with brilliant prospects for continuous work, has arisen. Quick to seize this opportunity, Vickers Ltd. of England, under the name of Canadian-Vickers, Ltd., is establishing a complete shipbuilding and ship repairing plant at Montreal, capable of constructing and repairing the largest vessels using the port.

For repair purposes a floating dock was sent out from England capable of lifting 25,000 tons and repairing a ship 700 ft. in length. For ship construction a slip 600 ft. in length, but capable of extension, is being constructed on land reclaimed by the harbor commissioners at Maisonneuve. For the walls of this slip and for adjoining machine shops and factories, approximately 2000 concrete piles are being used. After exhaustive inquiries into the different types of concrete piles on the market, the company decided on the Pedestal pile, which has been used with gratifying results by the governments of the United States and Canada and by large corporations in both countries. The pile is driven exclusively by the MacArthur Concrete Pile & Foundation Company of New York, which possesses the patent rights for the United States, Canada and other countries.

The general contract was awarded to E. G. M. Cape, one of Montreal's leading contractors, while the piling was placed in the hands of the MacArthur Concrete Pile & Foundation Company. Seven hundred and forty-seven of these piles, averaging about 22 ft. in length, have been driven under the shipbuilding slip. Four most satisfactory tests were made, a load of 45 tons, 50 per cent. more than the load the piles were to bear, showing no appreciable settlement. The piling required for the shops, etc., is now being driven.

Human Element in Efficiency Work

Mellville W. Mix, president Dodge Mfg. Company, Mishawaka, Ind., recently delivered an address on "Efficiency, Its Use and Abuse," before the Executive Club, Chicago, from which the following extracts are taken:

"No efficiency work was ever successful that did not earn for itself the approval and satisfaction of the worker; or, in other words, his spiritual co-operation must be secured. We don't work well under any system if we have the strain of machine methods in our minds, yet in our very capacities as executives we may be endeavoring to press that yoke on those under our supervision without a thought that the same sentiments and feelings that control our disposition to work also exist in the minds of those associated with us.

"We talk about 'mixing.' Has it ever occurred to you that the same glad hand and smile and consideration to our fellow workers may seem more to us and to those receiving them than the same evidence of good fellowship which we may effusively give to a customer, or to some from whom we may expect to benefit through a business transaction? If we seek to influence a business deal with 'good mixing,' why not go further and give some of it to our associates that we are with every day and who work with us shoulder to shoulder, for better or worse? They want it; they like it. You liked it when you were in their places, and you responded to it or you would not be where you are today.

"If you worked for a man or firm who didn't give you that cheer and comfort of a certain comradeship, the chances are you quit the job and found a more congenial atmosphere; and under that influence the best that was in you came out, and you delivered the goods you could have delivered to your former employer if he had known how to encourage you. All effort to be effective and gratifying must be collaborative. There may be other routes to success, but they have no sign-posts pointing the way. We may get there, and we may not; in any event, it is not likely to be a pleasure and we may travel crooked and rough roads when shorter and happier pathways are available.

"I do not mean to be sentimental in this matter. We often find men who are apparently successful who say there is no sentiment in business; to such, I say 'bosh.' I wouldn't give the snap of my finger for the business or organization that does not contain some sentiment, some vestige of a human soul. No vital problems are finally and satisfactorily disposed of that do not contain some consideration of the human element and, as for myself, I prefer not to deal with any conditions or form of organizations—social, political, or commercial—in which the dominating influence is actuated by an arterial circulation of ice water. It doesn't get anywhere. Every one who comes in contact with it gets a chill. Other connections are sought at the first opportunity where the broad human spirit does prevail. We can nearly always tell the dominating spirit that pervades an organization on the moment we come in contact with any part of it. In the right sort, everybody radiates enthusiasm, good cheer, courtesy, and consideration. There is no greater asset to any business than occupational good-will, yet it is never seen in a financial statement and would probably be blue-penciled if it were stated and appraised, because of its intangibility. Nevertheless, it is one of the most important factors in developing a successful business.

"Corporate or organized personality finds its origin in the executive, and in so far as he recognizes its value as a world or business force, his undertakings will prosper as he capitalizes it in the minds of those of the public with whom his enterprise comes in contact. The unseen, unfelt, intangible thing then becomes the real, active force that makes the wheels go around. No task is severe, no difficulty is unsurmountable, no requirement is too exacting where this spirit really prevails. We cannot buy it, we cannot produce it, except as we cultivate it within ourselves, and expand the usefulness by radiation and encouragement. The human element, therefore, becomes the most important controlling factor in operative standardization, and to just the extent to which it is recognized and developed may be measured the ultimate success of any and all efficiency undertakings."

Putnam Machine Company Changes Hands

The purchase of the entire capital stock of the Putnam Machine Company, Fitchburg, Mass., by Manning, Maxwell & Moore, Inc., New York, is an event of much interest to the trade, as the Putnam Machine Company is among the pioneer machine tool manufacturers of the country. It was started in a small way in 1836 by Salmon W. and John Putnam, who were the originators of a number of mechanical features, some of which are standard to-day on modern machine tools, among which can be mentioned the feed rod for operating the apron of lathes, the adjustable lathe tailstock and the universally adjustable box and hanger for carrying line shafting. They were also the originators and builders of the widely known Putnam engine. They produced the first set of hardened steel ring and plug gauges ever manufactured in this country. They were also the first to bring out an upright drill with a revolving table and an adjustable arm to swing around the column of the drill, and from their early experimental and development work in the matter of gear cutting the present gear cutters of such high efficiency have been produced.

From a small beginning the company has grown until today its plant covers about 14 acres. It has progressed with the times, and is to-day the leading producer in the world of heavy railroad machine tools, such as locomotive driving-wheel lathes, coach-wheel lathes, axle lathes, car-wheel borers, hydrostatic wheel presses and metal planers and lathes of all sizes, most of these tools being covered by broad patents. The company holds a high reputation for precision and accuracy in its workmanship, as may be evidenced by the fact that when the Rogers ruling machine, now a recognized standard for calibration work to the extent of divisions to the one-one hundred thousandth part of an inch, was being evolved, the Putnams produced the lathe and the lead screws for developing the machine.

Of the old stockholders of the Putnam Machine Company, S. W. Putnam, son of the founder and himself a designer of wide reputation, and his son, S. W. Putnam 3d, will continue their connection with the company, which will retain the name of the Putnam Machine Company and be operated on its own identity, as are the various other subsidiary companies of Manning, Maxwell & Moore, Inc. By the purchase, the old officers and directors of the Putnam Machine Company automatically ceased to hold office, and the following are its new directors: Salmon W. Putnam, Alfred J. Babcock, John N. Derby, Percy M. Brotherhood and George D. Branston, the last four mentioned being executive officers of the purchasing company.

Manning, Maxwell & Moore, Inc., has been recognized for years as the largest railroad and machinists' tool and supply house in the world. It has a number of factories and branch sales offices in the principal cities of this country and abroad. Charles A. Moore, the president and one of the original partners of the company, and through whose efforts the concern was brought to its present high standing and reputation, has for some time been in Europe, but is expected to return to this country in the near future. On or about October 1 the stock, which has heretofore been carried at 85 Liberty street, New York City, will be carried at the company's distributing station at 446 Communipaw avenue, Jersey City, N. J., from which point shipments will be made. It has recently taken new offices of about 24,000 sq. ft. (double the present office quarters) on the twentieth and twenty-first floors of the building at 119 West Fortieth street, New York, which will be occupied shortly after October 1.

The pressing of disks of metal into deep cups was described at length by Oberlin Smith, president Ferracute Machine Company, Bridgeton, N. J., at a meeting of the British Association, in Birmingham, England, September 15. He told of the steps taken to insure a flow of the metal instead of puckering or wrinkling at the edges, the method adopted being a top blank held down on the plate as the punch carries the center of the disk downward in the die.

The Bryan Show Case Company, Bryan, Ohio, will shortly be located in its new building. This is a rectangular structure, 50 x 175 ft., two stories, of brick construction, and is connected with the old plant, 40 x 92 ft. The new factory will be modern in every particular.

The Machinery Markets

Not in some time have reports of such uniformity as to quiet conditions in the machinery trade been received. While the tendency to put off into the future additions to manufacturing equipment is unquestionably general those who use machinery are fairly busy, though they, too, have fewer orders on their books than has been the case in some months. In the New York territory the greater ease with which deliveries can be made is felt in resultant decisions not to buy at this time equipment on which inquiries have been put forth. General manufacturing is fairly active in Philadelphia, although both large and small users of machinery are hesitating in buying. Similar conditions prevail in New England where the makers and sellers of machinery have found trade dull. Although the demand for small tools has been steady in Cleveland and the Otis Steel Company has a fair list out, business on the whole is rather quiet. In Cincinnati both the export and domestic trade has improved somewhat, with the railroads and auto trade doing a little buying, but complaint is heard still as to lack of new business. September was a better month than August in Detroit, but in the last week demand was lighter. In Chicago, buying has been of a desultory character with the railroads only small buyers. Business has been light in Milwaukee, but prospects are pronounced better than they were a year ago. In Indianapolis, demand from the automobile industry has slackened, particularly that from the smaller plants, several of which are in financial difficulties, but other lines are running close to normal for this season. Manufacturers have had a good volume of orders in the Central South. Birmingham had a quieter week, but the underlying conditions in that section are good. New construction in Texas is promising for the fall and winter months. On the Pacific coast business has been fair, but most orders are small.

New York

NEW YORK, October 1, 1913.

A few machinery selling agencies had a fair week, but the trade generally found business decidedly slow. Industrial companies here and there have been purchasers of one or two machine tools, but most of these transactions involved small amounts. Some industrial concerns which put out inquiries a few weeks ago when they found it difficult to make deliveries keep pace with orders are not now confronted with that situation, and where they postponed buying are now inclined more than ever to hold off. In fact this waiting tendency is apparent in many directions. It is credited by some to uncertainty as to how the new tariff is going to affect business, while others hold that the tariff is not nearly so much of a factor as the prospective currency legislation and the money situation in general. The expected buying by the Bethlehem Steel Company, referred to a week ago, is now understood to have been postponed indefinitely. Machinery for the manufacture of shrapnel shells was to have been purchased.

The American Machine & Foundry Company, Carroll street, Brooklyn, N. Y., has purchased a plot of land fronting 100 ft. on Fifty-fifth street, near Second avenue, on which will be erected a power house and boiler factory. The company is now building a three-story factory on Fifty-sixth street in the rear of the plot just purchased.

The Aluminum Goods Mfg. Company, whose main office is at Manitowoc, Wis., is building a large plant on a site of 46 lots at 520-564 Belmont avenue and 214 Ridgewood avenue, Newark, N. J., to take the place of a smaller plant at Newark now in operation. The new factory, which is to be completed next spring, will be 60 x 200 ft., six stories, of brick construction and equipped with a sprinkler system. New manufacturing machinery will be installed, but the requirements have not yet been decided in detail. George Vits is president and J. J. Magee secretary-treasurer.

The New York Central Railroad Company is in the market for additional machine tool equipment for its shops at Albany and Buffalo. The list issued calls for five or six punch presses, a wheel press, a driving-wheel lathe and a carwheel lathe, some miscellaneous tools, including a pipe machine, and some woodworking machinery.

The Art Silk Yarn Company, 38 East Twenty-fifth street, New York City, has had plans completed for a factory which it will erect at Kingston, N. Y., comprising 17 one-story buildings. B. W. Wilkins is president.

The Quaint Art Furniture Company, Syracuse, N. Y., has plans in preparation for a three-story and basement factory, 57 x 252 ft., which it will erect at East Syracuse.

The city of Penn Yan, N. Y., has commenced work on an addition and extensive alterations to be made to its waterworks pumping station.

The Niagara Canning Company, Lockport, N. Y.,

recently incorporated by Edward P. Marvin, Frank B. Rhodes, 51 Grant street, and others, is completing a factory building on lower Market street, East Lockport.

The U. S. Lens Company, Geneva, N. Y., is receiving bids for a two-story and basement factory, 100 x 212 ft., which it will build at an approximate cost of \$60,000. C. E. Wilson is manager.

The Buffalo Incubator Company, Buffalo, is building an addition to its plant on Bradley street, near Dart street, in that city.

J. F. Weinheimer, 360 Genesee street, Buffalo, manufacturer of plumbers' supplies, is building an addition to his factory and warehouse at Genesee and Pratt streets.

The American Agricultural Chemical Company, Buffalo, is building a \$30,000 addition to its acid plant at Lewis and Lyman streets and the Erie Railroad.

Plans are in preparation for a printing plant to be erected by the J. W. Clement Company at Seymour and Lord streets, Buffalo. The buildings will be one and three stories, 135 x 160 x 370 ft., and will cost approximately \$100,000. A large amount of new machinery and equipment will be required. The office and present plant of the company are at 84 Exchange street.

The Hewitt Rubber Company, Buffalo, has awarded the contract to the Charles Berricks Sons Company for the erection of a power house, 50 x 61 ft., one story, and to the Turner Construction Company the contract for the erection of a three-story factory and warehouse addition, 90 x 460 ft., to be made to its plant at Kensington avenue and the New York Central Railroad Belt Line.

McKaig-Hatch, Inc., 1584-1590 Niagara street, Buffalo, N. Y., recently organized, has purchased machinery and tools to manufacture drop forging and combination pliers. Archibald McKaig is president; Chauncey R. Hatch, secretary and treasurer, and Harry C. Young, vice-president.

New England

BOSTON, MASS., September 30, 1913.

Business remains dull with builders of and dealers in machinery, with a certain amount of improvement in places, consisting mostly of new prospects of orders. General manufacturing, however, is in pretty good shape. The houses which buy machinery are complaining very little of conditions, but they are holding off in increasing their capacities. Stocks are low everywhere. In the hardware trade the manufacturers look for a sharp demand for hurried shipments between now and December 1. Comparatively few announcements of additions to manufacturing plants are reported.

A new Massachusetts law raising the limit of age of employment of boys to 16 years is causing a considerable amount of reorganization of factory forces. Many lads have been discharged and in certain works some degree of disorganization has resulted.

The B. F. Sturtevant Company, Hyde Park, Mass., has added to its products a line of air washers for use in purifying the air in ventilating systems and in washing or humidizing the air in industrial plants.

Walsh's Holyoke Steam Boiler Works, Holyoke, Mass., will build a brick addition 20 by 42 ft., one story.

The Rubber Regenerating Company, Naugatuck, Conn., will erect a three-story building 55 by 130 ft., in addition to a factory already noted.

The Sprague Meter Company, Bridgeport, Conn., will build a one-story addition 47 by 63 ft.

The New Britain Gas Light Company, New Britain, Conn., will erect an addition 25 x 60 ft., two stories, and 25 by 25 ft., one story.

Edwin Hills, Plainville, Conn., will build a three-story factory in three sections, 40 x 66 ft., 44 x 90 ft. and 25 x 34 ft.

The Turners Falls Company, Turners Falls, Mass., will build an additional power plant next spring, the plans calling for putting in the foundations this fall.

The Connecticut Electric Mfg. Company, Bridgeport, Conn., is arranging to manufacture a line of motorcycles, patents for which have recently been purchased. The plan is to do only the assembling at Bridgeport in the beginning and to create a complete factory in the future, probably next season.

The Pepperell Mfg. Company is planning to create a hydroelectric power plant at Union Falls, on the Saco River, to develop 10,000 hp., according to a dispatch from Biddeford, Me. Flowage rights are being acquired and a great storage reservoir will be created. The total estimated cost is \$1,000,000.

The New Britain Machine Company, New Britain, Conn., has acquired additional land which it is stated will be utilized for further extensions of its large shops, to which very large additions have just been made.

The Birmingham Iron Foundry, Derby, Conn., has acquired the land occupied by the Derby Iron & Steel Works, and proposes to erect a large extension to its roll department.

The business of the Riverside Boiler Works, Cambridge, Mass., manufacturer of iron and steel range boilers and expansion tanks, has been incorporated under the same name with a Massachusetts charter. The business was established 17 years ago by the late Francis L. Willard. John S. Nicholl is president; John J. Martin, vice-president, and John A. Trott, treasurer and general manager.

The Charles Parker Company, Meriden, Conn., will build an addition for its woodworking department 25 x 125 ft., three stories.

Bids will be received until October 14 by the commissioner of waterworks, Lynn, Mass., for furnishing a steam turbine-driven centrifugal pumping unit.

Philadelphia

PHILADELPHIA, Pa., September 29, 1913.

Quieter conditions prevail in the local machinery market. Manufacturers and merchants report fewer sales. The larger users of tools are making light purchases and, like the smaller buyers, are hesitating and disposed to await developments before making improvements or extensions to plants or equipment. Practically no movement in railroad buying has been in evidence. Power equipment appears to be the only line in which the demand has been fair, and the bulk of such business has been in the smaller horsepower. New inquiries for machine tools have been unimportant, being largely for single tool equipment. The second-hand machinery market is dull, although somewhat better inquiry for small power equipment has been before the trade. Steel casting plants report little betterment in conditions, operations being on an irregular basis. Gray-iron foundries are moderately well engaged, although the demand for machinery castings is reported light.

The contract for the municipal machine shop for the city of Philadelphia, to be built at Eleventh and Reed streets, was awarded to Cramp & Co. at approximately \$99,500. The remainder of the total appropriation of \$125,000 will be used for the purchase of tools and equipment. All the repair work for the bureaus of police, fire and water will be done at the new shop.

The directors of the Pennsylvania Railroad have announced their intention of further extending the proposed electrification of its suburban passenger service. In addition to its main line electrification to Paoli, plans now include the Chestnut Hill division, covering a distance of 12 miles from the Broad street station. The cost of the Paoli improvement has been estimated at \$4,000,000, and that of the Chestnut Hill electrifica-

tion at \$1,250,000. The matter of supplying electric power for the operation of these branches does not seem to be fully decided upon. No plans are reported for the construction of a company electric plant and it is understood that for the time power will be purchased in the open market.

Bids will be received by G. W. Norris, director, City Hall, Philadelphia, until October 6 for an electric light and power system for a pier.

William H. Boardman, engineer, 426 Walnut street, this city, and Arthur Starr, city clerk, Woodbury, N. J., are taking bids for furnishing and installing a mechanical filtration plant, with a capacity of 3,000,000 gal. for the city of Woodbury, N. J. Specifications may be obtained from either the engineer or the city clerk.

George D. Porter, director, department of public safety, Philadelphia, will receive bids until October 6 for boilers, feed pumps, stacks, and further equipment for the bureau of correction. Plans and specifications may be obtained at the office of the director, room 215, City Hall.

Maurice R. Dillon has begun work on a four-story reinforced concrete and brick general manufacturing building at Hunting Park avenue and Stokely street, Philadelphia, for H. R. Schoch, of the Autocar Sales & Service Company. The building will be 241 x 270 ft., and equipped for light manufacturing purposes. Electricity will be used for power, although a high pressure boiler will be installed for heating. Sidings will extend from both the Philadelphia & Reading and the Pennsylvania railroads.

The Universal Paper Bag Company, New Hope, Pa., has broken ground for an addition to its plant to be of the same size as the existing building, to cost \$50,000 with equipment.

Samuel G. Dixon, M.D., health commissioner, is taking bids on plans for the installation of a central heating plant to be erected and equipped for the State sanitarium for tuberculosis, near Hamburg, Berks County, Pa.

It is stated that Liebowitz & Son, Hazleton, Pa., will have plans prepared for the erection of a brick and stone factory building, to cost about \$60,000.

The Harrisburg Brass & Bronze Factory, Harrisburg, Pa., has obtained a permit for an addition to its foundry on South Cameron street.

Reports, as yet unconfirmed, are to the effect that the American Steel & Wire Company is having plans prepared for contemplated extensive improvements to its plant at Trenton, N. J.

Bids will be received by the engineer of sewers, Trenton, N. J., until October 8 for a new boiler for a pumping station.

The International Ice Machine Company, Wilmington, Del., has been incorporated with a capital stock of \$25,000. The company will manufacture equipment for ice plants. Herbert E. Latter, W. J. Maloney and O. J. Reichard, of Wilmington, are named as incorporators. Details as to manufacturing plans are not available.

The Robert Jenkins Brass Company, 527-529 Colvin street, Baltimore, Md., advises that the addition planned to its plant, which was noted last week, will be of corrugated iron with steel frame. The company will install new brass furnaces and other equipment in proportion. The additions will enable the company to increase its output to three times its present capacity. It has been in business not quite a year.

Cincinnati

CINCINNATI, OHIO, September 29, 1913.

The machine tool builders in this section have still room for complaint as to new business coming in. Although there has been a slight but steady improvement in inquiries, order books do not, as a rule, make a very good showing for this season. The export trade is probably in better shape than for some time, but it is not up to standard by any means. The railroads are doing some buying, and there are a few replacement orders from automobile manufacturers. The boiler and tank manufacturers are busy, and the future is encouraging for them. Second-hand machinery dealers also report some improvement.

V. T. Price, director of public service, Cincinnati, will open bids October 13 for two direct-connected steam turbine generators, for installation in the waterworks plant. Separate bids will be received for two watertube boilers, with boiler feed pumps, mechanical stokers, etc.

The Electric Service Company, 300 Main street, Cincinnati, has been incorporated with \$15,000 capital

stock, to deal in electrical equipment and supplies. A. A. Faber is one of the incorporators.

The Procter & Gamble Company, Cincinnati, will erect a large addition to its plant for the manufacture of hydrogen gas. The Stacey Mfg. Company, Cincinnati, has obtained the contract for building two large gas containers.

The Davis Dairy Machinery Company, Cincinnati, has leased a larger factory building at Bank and Patterson streets, and will soon move from its present location on Third street. Considerable light equipment will be required, in which is included a few small electric motors.

The American Oil Pump & Tank Company, Cincinnati, has been incorporated with \$25,000 capital stock, and will soon open a factory in Cincinnati, for which some equipment will be required. The company already has a plant at Dayton, Ohio, and its present intention is to move the Dayton factory to Cincinnati. S. F. Kemper, Cincinnati, is one of the principal stockholders of the company.

Officials of the Jeffrey Mfg. Company, Columbus, Ohio, state that the plant of the Ohio Malleable Iron Works, a subsidiary company, recently partially destroyed by fire, will be rebuilt at once. The loss was estimated at \$50,000, fully covered by insurance.

The city of Dayton, Ohio, will soon award contract for a garbage reduction plant. It is stated that about \$100,000 will be spent for the necessary buildings and equipment.

F. H. Smith, architect, Dayton, Ohio, has been commissioned by the J. P. Davis Soap Company of that city to prepare plans for a five-story factory building.

The Charles D. Francis Company, Rushville, Ind., has had plans prepared for a two-story factory building, 50 x 100 ft., of brick construction. Woodworking equipment will be required. A one-story storage building, 30 x 100 ft., will also be constructed.

Indianapolis

INDIANAPOLIS, IND., September 29, 1913.

There is a perceptible slackening in the automobile business in this State, but other factories are running nearly normal for the time of year. The check to sales of automobiles has come largely from the West, where the short corn crop has temporarily cut down the purchasing power. It is between seasons for the automobile plants, being the time for making any proposed changes in the machines for next year's models. Some of the larger plants are operating almost to capacity; it is the smaller plants that suffer a contraction of work. Indiana is second among the automobile manufacturing States in the number and value of machines made, and this industry has been pushed to the limit. The competition has reached that stage where it is the survival of the fittest. Within the last few weeks there have been five receiverships for smaller concerns in Indiana. The latest is the Nyberg Automobile Works at Anderson, of which Fred Van Nuys has been appointed receiver.

The Johnson & Waggoner Acetylene Gas Machine Company, Indianapolis, has been incorporated with \$10,000 capital stock to manufacture acetylene gas generators. The directors are William K. and B. E. Johnson and Cleveland Waggoner.

The Security Banking Machine Company, Indianapolis, has been organized with \$30,000 capital stock to manufacture novelties. The directors are Ira D. Lambertson, E. B. Herod and L. M. Parkhurst.

The Indiana Paving Brick & Block Company, Indianapolis, has been incorporated with \$30,000 capital stock to manufacture clay products. The directors are William W. and Walker W. Winslow and R. M. Morish.

The Engine Company of Indiana, Terre Haute, Ind., has been incorporated with \$10,000 capital stock to manufacture engines. The directors are W. P. Childs, O. E. Childs and Omer Mader.

The plant of the Evansville Wire & Steel Company, Evansville, Ind., a branch of the Anderson Wire & Steel Company, Anderson, Ind., is expected to start in operation about November 1.

The Vincennes Paper Company, Vincennes, Ind., has taken over the plant of the Empire Paper Company and is installing stokers, coal-handling machinery, automatic sprinklers, etc. The company advises that it is in the market for a good second-hand engine, Buckeye preferred, about 250 hp.

S. W. Bowser & Co., Fort Wayne, Ind., maker of self-measuring oil tanks and oil-storage systems, will make an addition to its tank department, 90 x 160 ft., of brick, to cost \$20,000. The addition will be equipped

with runways for cranes, but no additional cranes will be purchased at the present time and the only new machine to be installed will be a special one made by the company.

Cleveland

CLEVELAND, OHIO, September 30, 1913.

The market continues rather quiet. Little business is coming out in small lots, but there is a steady run of orders for single tools. The only new inquiry of any size is from the Otis Steel Company for machinery equipment for a machine shop to be built in connection with that company's new steel plant. Second-hand machinery is quiet. The W. M. Pattison Supply Company, Cleveland, will shortly have listed for sale about 1000 second-hand machines that it has purchased from the various plants of the Maxwell Motor Company. Crane makers report a good volume of orders and inquiries, but these are mostly for small installations. Among the inquiries for cranes is one from the Lake Shore Railroad.

The Otis Steel Company, Cleveland, has the following list out of machine tools for its new machine shops:

- One 36-in. planer.
- One 24-in. lathe.
- One 36-in. lathe.
- One 20-in. shaper.
- One 24-in. shaper.
- One No. 3 milling machine.
- One 5-ft. radial drill.
- One 20-in. upright drill.
- One 600-lb. steam hammer.
- One 5-ft. boring mill.
- One cold saw.
- One dry tool grinder.
- One hydraulic wheel press.

The Cleveland Railway Company will shortly place contracts for the erection of new car repair shops. These will include three main buildings, 134 x 350 ft., 142 x 300 ft. and 142 x 157 ft. Some new machinery equipment will probably be required.

The Ford Motor Company, Detroit, is planning the erection of a large assembling plant in Cleveland. It is stated that the building will be an eight-story structure, 200 x 600 ft.

It is announced that a company will be organized with a capitalization of \$250,000 to erect a plant in Cleveland for building cyclecars. Francis R. Hoyt is at the head of the enterprise.

The Cleveland Machine Knife Company, Cleveland, has placed a contract for the erection of a new plant on West 114th street, near West Madison avenue. It will be a one-story structure, about 40 x 250 ft. Orders for the equipment have been placed.

Work on the erection of the new car repair shops to be built by the Lake Shore Railroad, at Ashtabula, Ohio, the general contract for which was placed recently, will be started this fall. However, it is announced that the machinery equipment will probably not be purchased for several months.

The Leader Brass Foundry & Mfg. Company, Cleveland, has been incorporated with a capitalization of \$10,000 to engage in general brass working. H. W. Frecht, F. W. Frecht, A. H. Meyer and others are the incorporators.

Bids for coal-handling machinery for the city infirmaries at Warrensville, Ohio, will be received until October 6 by C. W. Stage, director of public service, Cleveland.

The Atlantic Foundry Company, Cleveland, has increased its capitalization from \$35,000 to \$100,000.

The Collinwood Iron, Brass & Aluminum Foundry Company, 17004 Waterloo road, Cleveland, will erect a new foundry building about 50 x 60 ft.

The Hendrickson Machine Company, Cleveland, has been incorporated with a capitalization of \$10,000 by John H. and F. E. Hendrickson, who formerly conducted their business under the name of the Cleveland Mfg. Company, at 2601 Vermont avenue. The newly organized company has secured a site on East Fourteenth street, on which it will build a new plant next spring. It is engaged at present in general machine shop repair work and in the manufacture of washing machines. When it moves into the new quarters it will add to its present lines the manufacture of vacuum pumps and electrical washing machines.

The city of Canton, Ohio, will shortly begin with the erection of a new sewage disposal plant which will cost from \$200,000 to \$300,000. Plans are being prepared by R. W. Pratt, engineer, Cleveland.

The Batavia Foundry Company, Batavia, Ohio, will enlarge its plant by the erection of an addition 36 x 40 ft.

The Charpiot & Mills Mfg. Company, Toledo, Ohio, has been incorporated with a capitalization of \$20,000 to make a line of gas stoves. The business, which has heretofore been conducted by Charpiot & Mills, will be enlarged. The stove is equipped with a patented device, which, it is claimed, removes all danger of escaping gas.

The village of McComb, Ohio, is in the market for a 150-hp. tubular boiler for its lighting plant.

The Ideal Moistener Company, Findlay, Ohio, has been organized and will establish a moistening device of metal for office purposes. W. J. Moss is the general manager.

Bids will be received by the village of Euclid, Ohio, October 12, for a high-pressure pumping station and water tower. Plans are on file at the office of the F. A. Pease Engineering Company, Cleveland.

The American Fork & Hoe Company is erecting a new shop in Ashtabula, Ohio, for building special machinery used in its various plants. The building will be a two-story structure, 42 x 62 ft.

The National Tire & Rubber Company, East Palestine, Ohio, has been incorporated with a capitalization of \$150,000, and plans the erection of a two-story plant, 43 x 212 ft. C. J. Davis is president and Wm. Smith is secretary and general manager.

The U. S. Mfg. Company, Warren, Ohio, has been organized to manufacture vacuum sweepers. The plant will be located in the building of the Winfield Company. B. D. Knapp is president and sales manager.

Bids will be received by J. Davin, director of public service, Steubenville, Ohio, until October 9, for a mechanical filter plant.

The Buckeye Aluminum Company, Wooster, Ohio, has increased its capital stock from \$150,000 to \$250,000. Nothing is known as to any increase in manufacturing facilities.

Chicago

CHICAGO, ILL., September 29, 1913.

Desultory buying of machinery continues to characterize the situation in this market. Expected railroad purchases have not yet materialized in any substantial degree and sales in this direction are confined to the occasional tool for which there is immediate need. There has also been an appreciable decrease in the number of interurban power and electric lighting projects during the past several weeks, diminishing the activity in the class of machinery required for such installations. Machine shop tools have been moving slowly, with no large projects under way.

The Charles H. Kellerman Foundry & Machine Company, Chicago, will build a seven-story manufacturing and warehouse building on its property at Erie and Kingsbury streets, to cost \$115,000, and expects to remove the foundry plant which has been operated on that site to Benton Harbor, Mich., where a new building will be erected and equipped as a foundry and machine shop at a cost of \$20,000.

Holmquist & Co., Chicago, manufacturers of woodenware products, have arranged to erect a new manufacturing building at West Thirty-fifth street and South Maplewood avenue which will cost \$50,000.

Lertell Bros., Chicago, will build a one-story brick foundry, 25 x 80 ft., to cost \$3000 at 7731 South Chicago avenue.

The H. P. Nelson Company, Chicago, manufacturer of pianos, has taken out a permit covering the erection of a three-story factory, 50 x 134 ft., at 3232 West Chicago avenue, to cost \$23,000.

The William Glader Machine Works, Chicago, has been incorporated with a capital of \$5000. The business now incorporated has been operated under this name for some time past at 210 North Ann street.

The Empire Iron & Steel Company has had plans completed for its new Chicago warehouse in the central manufacturing district. The building will be of heavy mill construction, two stories, 48 x 350 ft.

The Hardware Foundry Company, North Chicago, Ill., has acquired a tract of 10 acres adjoining its present plant and it is understood that the plans for plant extension which have been under consideration for some time will now proceed.

The Elgin Silo Company, Elgin, Ill., has been incorporated with a capital stock of \$100,000 by Donald McMillan, Byron B. Layton and Richard H. Howard, and will equip a plant for the manufacture of silos, etc.

The Bennett Ice Company, Canton, Ill., has been incorporated with a capital stock of \$15,000 by Theophilus Bennett, Frank L. Bennett and N. M. Culver, and will equip an ice manufacturing plant.

The Ford Mfg. Company, Rockford, Ill., is about to add to its plant a building, 40 x 140 ft., to provide increased manufacturing facilities. Work will be started October 1.

The Citizens' Gas & Electric Company, Waterloo, Iowa, is preparing to build a power plant near that city for which an expenditure of \$600,000 is contemplated.

The Red Jacket Mfg. Company, Davenport, Iowa, whose foundry was recently destroyed by fire, has let the contract for the rebuilding of the plant.

Davis City, Iowa, has voted to issue \$6500 bonds for a waterworks system.

Carlton, Minn., has voted to issue \$25,000 bonds for a waterworks system.

The Plattner Implement Company, 1612-1618 Fifteenth street, Denver, Colo., plans to make material improvements for 1914 in order to take care of increased business. Detailed plans are not yet available.

Milwaukee

MILWAUKEE, WIS., September 29, 1913.

The close of September shows a light volume of business in this district, yet somewhat larger than in the corresponding period a year ago, with prospects considerably better than they were then. The demand for machine tools is confined to small or individual orders, with several medium-sized lots in prospect before the end of the year. Foreign inquiries are picking up, and some business is in sight from this source. Used machinery is slow, there being only a sprinkling of purchases. Collections are reported backward.

Schedules in bankruptcy filed by the Keelyn Electric Company, Milwaukee, show liabilities of \$40,758 and assets claimed to be worth \$68,694. The company is being reorganized.

The Chain Belt Company, Milwaukee, has appointed the Industrial Engineering & Machinery Company, Montreal, Can., exclusive agent in the Dominion of Canada for its products. The company specializes in chain belt concrete mixing machinery.

The village of Palmyra, Wis., has voted \$20,000 to be used in the construction of a municipal waterworks plant. Bids for equipment will be received within a few weeks.

The Smith & Post Company, 1125 Thirty-second street, Milwaukee, machinery builder, has changed its name to Smith Engineering Company and doubled its capital stock, which now is \$200,000. The changes are part of a general expansion policy, the details of which are not quite ready for publication.

The Chicago, Milwaukee & St. Paul Railway Company will expend \$40,000 in rebuilding its division headquarters, coal handling plant and roundhouses at North LaCrosse, Wis., during the coming winter.

Otis C. Friend, sales manager; Frank L. Mitchell, treasurer, and W. H. Armstrong, assistant-treasurer, of the Mitchell-Lewis Motor Company, Racine, Wis., automobile manufacturer, have organized the Mitchell-Lewis Company with a capital stock of \$10,000 as a distributor of some of the Mitchell-Lewis products.

The Bonduel Feed & Light Company, Bonduel, Wis., has been organized with \$10,000 capital stock to build a flour and feed mill and an electric light and power plant. R. C. Wendt, Adolph Spengler and John Westphal are the promoters.

The Beaver Dam Malleable Iron Company, Beaver Dam, Wis., sustained a loss of \$5000 by fire last week. A 2-ton crane was wrecked and will be replaced immediately.

August Arndt, Appleton, Wis., manufacturer of screen plates and brewery bottoms, has opened a brass foundry, the first commercial foundry of its kind in Appleton. The foundry is in charge of Joseph Thomas, who has invented a new process of casting red brass plates.

A veneer and box-making plant is to be established at Tomahawk, Wis., by the Tomahawk Veneer & Box Company, incorporated with a capital stock of \$50,000. Work on the plant will start at once. Max Meyer and Julius Grummel are the owners.

The city of Appleton, Wis., has ordered a 200-hp. Diesel type oil engine for its municipal waterworks system from the International Gas Engine Company, Cudahy, Wis.

W. A. Whitney, boiler manufacturer, Superior, Wis., has organized a corporation styled the Whitney Boiler Works, capitalized at \$40,000. H. V. Gard and E. L. Brotherton are associated with him in the enterprise.

The Yale Steel Stamping Company, Oostburg, Wis., has been incorporated to conduct a general machine

shop business with a capital stock of \$75,000. The incorporators are F. A. Tuschen, A. G. Schenerell and Dr. J. Schenerell.

An electric light and power plant will be erected at Wauzeka, Wis., by the Wauzeka Electric Light & Power Company, which has just been organized by James Tesreau, Frank Keld and James Willard. The capital stock is \$5000.

Detroit

DETROIT, MICH., September 29, 1913.

September has been a good month in the local machinery market and the total amount of business transacted will run considerably ahead of the figures for August. A lighter demand for standard lines of machine tools was reported during the last week and sales have also been small, individually. Inquiries are quite numerous but are largely for single tools and are coming chiefly from the general manufacturing trade. Machine shops and tool builders are busy, but little new business is coming in, it is reported. In the foundry trade the demand for both steel and gray-iron castings is holding up fairly well. The second-hand machinery market is reported dull and some dealers have considerable surplus stock. Building conditions are looking better and the outlook is pleasing, owing to the anticipation of considerable factory and commercial construction being figured on this fall.

The Joseph N. Smith Company, Detroit, manufacturer of automobile body hardware, has purchased a large factory site on St. Antoine street and is having plans drawn for the erection of a modern factory building estimated to cost \$75,000.

The W. J. Burton Company, Detroit, manufacturer of metal building materials, now located at 150 Congress street, West, has acquired a two-acre site on the Detroit Terminal Railway and is having plans prepared for a new factory which will greatly increase its output. The building will be one and two stories, and will be modernly equipped. Cost \$30,000.

The Van Blerck Motor Company, Detroit, manufacturer of motor boat engines, which has been operating in temporary quarters since the burning of its plant some time ago, will move its business to Monroe, Mich. The company has broken ground for a one-story factory building, 60 x 175 ft., which will enable it to double its former output.

The Irvine & Mier Company, Detroit, has been incorporated with \$3000 capital stock to manufacture plumbing supplies. John S. Irvine and Jacob F. Mier, Jr., are the principal stockholders.

The Charles Amos Company, Detroit, has acquired a one-acre factory site on the outer belt line and is having plans prepared by Burrows & Wells, architects, for a large factory building. The company manufactures builders' iron and ornamental iron, brass and bronze.

The American Chemical Works, Detroit, manufacturer of glue, has begun the erection of a new plant at Ecorse, a Detroit suburb.

Selik Bros., Detroit, machine and tool manufacturers, will erect a new plant, 80 x 130 ft., at Twenty-fourth and E streets.

The former plant of the Detroit Wire Spring Company, Detroit, has been acquired by the Signal Motor Truck Company, and will be equipped for the manufacture of automobile delivery cars.

Stecher & Myers, Detroit, manufacturers of pharmaceutical supplies, are having plans prepared for the erection of a four-story factory building, 60 x 120 ft.

The Detroit Pressed Steel Company, Detroit, has increased its capital stock from \$200,000 to \$250,000.

The Auto City Bow Company, Detroit, has been incorporated with a capital stock of \$10,000 and will engage in the manufacture of bent goods.

M. M. Stanton & Co., Detroit, clothing manufacturers, will erect a two-story brick factory building at Hastings and Hancock streets.

The Oakland Motor Car Company, Pontiac, Mich., has awarded contracts for a large addition to its plant. The new building will be 70 x 70 ft., three stories.

The Hine Lumber Company, Bay City, Mich., has begun the erection of a salt-making plant to have an annual capacity of 60,000 bbl. All machinery will be electrically operated.

The Clarage Foundry Company, Kalamazoo, Mich., has broken ground for a large addition to its plant, to cost \$50,000.

The Houghton County Traction Company, Houghton, Mich., is remodeling and enlarging its power plant

at Laurium and will install additional equipment sufficient to double its capacity.

The Kalamazoo Motor Vehicle Company, Kalamazoo, is being established by Frank G. Clark and others and is equipping a plant. The new company is capitalized at \$35,000.

The Hubbard Spring Works, Pontiac, Mich., has about completed an addition which will practically double its capacity. The company, which manufactures spring cotters and brass specialties, reports an excellent volume of business. No equipment will be required at present.

The Central South

LOUISVILLE, KY., September 29, 1913.

The unusually good demand for boilers, which has been the feature of the month, has continued during the past week, and manufacturers report a good volume of business actually booked, as well as plenty of prospects. Most of the boilers are to be used in factory extensions and enlargements, which makes the belief that business at large has been adversely affected by general conditions seem incorrect, as far as this territory is concerned. Other lines of machinery, such as power equipment, are not in as active demand, though the establishment of many new automobile garages, as heretofore suggested, is probably helping the machine tool trade as much as any other one thing, and is moving a good many electric motors.

J. Schwarzwald & Sons, Louisville beer coopers, report that plans for a new factory, which have been in hand for several months, have been abandoned for the present.

The General Construction Company, which as recently reported is building a large apartment house at Fourth street and Ormsby avenue, will install its own lighting plant, and is now taking bids on the equipment. Its offices are in the Inter-Southern Building.

The blacksmith shop of the J. H. Marx Transfer Company, 140 North Shelby street, Louisville, was burned last week.

The stone-crushing plant of the R. B. Tyler Company, Louisville, was burned recently with \$50,000 loss, including the power equipment and crushers. It probably will be rebuilt.

The Cold Water Timber Company, organized at Huntington, W. Va., with \$15,000 capital stock, will build a sawmill in Martin County, Ky. S. J. Hyman is president.

T. H. McDonald, Flemingsburg, Ky., is reported to be considering the installation of a gasoline engine to develop power for a small factory.

Midway, Ky., is reported to be considering the establishment of a water system.

Moss Johnson, Henderson, Ky., whose laundry was recently burned, has decided to reconstruct the plant and will be in the market for power and special equipment.

The Lebanon Junction Light & Power Company, Lebanon Junction, Ky., has been incorporated with \$4500 capital stock and is planning to install an electric light plant, it is reported. C. McL. Stinger, R. M. Hocker and others are interested.

The Kentucky Utilities Company, with offices at Lexington, Ky., is planning the installation of small electric light plants at Cecilian and Glendale, Ky.

The City Commissioners of Lexington, Ky., are considering calling for a vote on a \$200,000 bond issue for the purpose of installing a municipal electric light plant. A \$300,000 bond issue for the construction of a new city hall is also to be considered.

The Erie Basket Company, Limington, Ont., has decided to locate a factory at Hickman, Ky., and will begin to erect a building and purchase equipment about October 15. A heading and stave factory may also be established in connection.

The Big Creek Coal Company, Louisville, has announced that it will operate a large coal mine in Muhlenburg County, Ky. It has 5000 acres of coal lands which are to be developed. D. W. Gatlin, Madisonville, Ky., is president. The offices of the company will be at Bremen. I. Bailey, general manager, will begin buying machinery in the near future.

The Standard Oil Company is to erect a warehouse at Central City, Ky. A power plant and pump house will be equipped as part of the improvement, as they will be needed in connection with the operation of three large storage tanks.

Ira Fields, Jr., Harlan, Ky., is planning to organize a company at Whitesburg, Ky., for the establishment of an electric light plant in that town, which is in the

heart of the recently developed southeastern Kentucky coal fields.

R. C. King is building a machine shop at Carlisle, Ky., and will be ready to purchase equipment in the near future. The machine tools will be motor-driven.

The Central Motors Company, Owensboro, Ky., is constructing a garage which will be equipped for repair work. Elmer Little will be general manager of the company, which expects to complete its shop by November 1.

The Lawrenceburg Fertilizer Company, Lawrenceburg, Tenn., is being organized with \$25,000 capital stock and will establish a plant in the immediate future.

The Dill-Cramer-Truitt Corporation, Suffolk, Va., is preparing to award an important contract for power and sawmill machinery to be installed in Onslow County, N. C., where it is planning to erect one of the largest mills in the Southeast.

St. Louis

St. LOUIS, Mo., September 29, 1913.

The demand for machine tools shows a steady, though slow, improvement, and while the lists coming out are not large, the aggregate business is more encouraging with each succeeding week. The business is general, not being confined to any one line or any one section. The better feeling in commercial conditions since the crop losses were found not to be so great from the financial viewpoint as expected has had much to do with the improvement. Second-hand tools are in some request. Collections are reported fairly good.

The Concrete Paint Company, St. Louis, has been incorporated with a capital stock of \$10,000 by A. C. Wurst, William Grond and others to manufacture paints and painters' materials.

The Southern Motor Car Company, St. Louis, has been incorporated with a capital stock of \$15,000 by B. C. Quarles, J. D. Kerr and J. David Barth, and will equip a repair shop.

The Standard Tie & Timber Company, St. Louis, has been incorporated with a capital stock of \$20,000 by Philip G. and M. M. Hoffman and M. V. Marlow to engage in cutting and preparing ties and timber for market. Equipment will be bought.

Work has been begun by the water commissioner of the city of St. Louis on additions to the present coagulation and filter plant to increase the capacity of the plant to 160,000,000 gal. per day. The work, which will be completed about January 1, 1915, will involve a total expenditure of about \$3,000,000. It will include heating and electric lighting and power equipment.

The Mississippi Glass Company, St. Louis, has completed plans for a large addition to its fire brick plant at Vandalia, Mo., involving the expenditure of about \$50,000. An electric power house, kilns, molding plant, etc., are included in the plans.

The Bernardin Timber & Mfg. Company, Kansas City, Mo., has been incorporated with a capital stock of \$300,000 by J. M. Bernardin, Henry Koehler and Thomas A. Currier to engage in timber and saw mill business.

Representatives of the towns of New London, Center, Perry and Frankfort, Mo., have incorporated the North Missouri Light & Power Company, New London, Mo., with a capital stock of \$60,000, to equip for the distribution of electric power from the hydro-electric plant at Keokuk, Ia., to the towns named and the country surrounding. The current will be delivered to the new company at Ilasco, Mo. The directors are M. C. Briggs and P. M. Megown, of New London; M. J. Jones and J. D. Pitt, of Frankfort; E. W. Keithley and Van Elzea, of Center, and S. C. Gill and Wm. Tibbles, of Perry.

The Maryville District drainage board, Maryville, Mo., has issued \$30,000 bonds to complete drainage and pumping plant work under the direction of H. H. McClung, of Pickering, Mo.

The City Light & Traction Company, Sedalia, Mo., has plans for the immediate addition of 400 hp. to its present capacity, including boilers, generators, etc.

The Wilhoit Oil Refining Company, Joplin, Mo., will improve the equipment of the refinery at Joplin to increase its capacity. E. M. Wilhoit, Springfield, Mo., is president.

The Athletic Mining Company, Webb City, Mo., will replace the concentrating plant recently burned with a loss of \$40,000.

The J. W. Opie Mfg. Company, Kansas City, Mo., will erect and equip a factory for the manufacture of

mops and will also equip a building which it has leased.

The Doe Run and the St. Joseph Lead companies, conducting large operations in southeastern Missouri, are to be consolidated with a total capitalization of \$20,000,000. The St. Joseph Company has an issued capital of \$10,000,000. The Doe Run Company has \$6,600,000 stock and \$3,400,000 bonds outstanding.

The waterworks improvement which has been decided upon by the city of Charleston, Mo., will involve an expenditure of about \$40,000, including pumping station, tower and tank. C. H. Sexton is engineer in charge.

The city of Neosho, Mo., has completed plans for the equipment of a waterworks plant to cost about \$65,000.

The Centralia Garage & Vulcanizing Company, Centralia, Ill., has been incorporated with a capital stock of \$12,500 by L. H. Jones, L. Allan Copple, H. Ray Copple, G. C. Armstrong and others and will equip a repair shop.

The Home Ice & Supply Company, Edwardsville, Ill., has plans for doubling the capacity of the plant for the manufacture of ice. J. E. Levora is president.

The Arkansas Packing Company, Pine Bluff, Ark., will expend \$45,000 for equipment in its plant which is to be erected by Galbraith & Royce.

Tennison Bros., Texarkana, Ark., will equip an addition to their plant with the necessary machinery to manufacture steel ceiling and metal sash. About \$75,000 of equipment is contemplated.

The Fassman Handy Paper Case Company, Fayetteville, Ark., has been incorporated with a capital stock of \$10,000 by M. W. Fassman, M. L. Fassman and C. O. Teeter to equip a plant for specialty manufacturing.

The Fletcher Coffee & Spice Company's plant at Little Rock, Ark., destroyed by fire with a loss of \$100,000 will be replaced, it is stated.

H. Tysinger, 306 Louisiana street, Little Rock, Ark., is reported in the market for air compressing equipment.

The Wilson Lumber Company will install an electric lighting plant, waterworks, etc., in conjunction with the replacement of its mills, etc., recently burned. The total replacement cost will be in excess of \$100,000. W. M. Waterman is general manager.

The Celestine Oil Company, Muskogee, Okla., recently incorporated with a capital stock of \$25,000, by Geo. W. Sterlin and J. H. Winemiller, is in the market for equipment in connection with its operations.

The Golden Gasoline Company, Oklahoma City, Okla., has been incorporated with a capital stock of \$30,000 by H. E. Kelly, E. A. Butt, W. B. Tate and others and will equip for refining oil, etc.

The city commissioners, Oklahoma City, Okla., have authorized the city clerk to advertise for bids for a 3,000,000-gal. pump.

The Durant Grain & Elevator Company, Durant, Okla., has been incorporated with a capital stock of \$10,000 by W. F. Pendleton, E. W. Stewart and others and will equip a grain elevator.

The Pleiades Company, Aurora, Ill., is reported as having plans for the equipment of a cannery at Brookhaven, Miss.

The Deeson Oil Mills, Deeson, Miss., has been incorporated with a capital stock of \$75,000 by J. D. Brooks, Frank Haysen and W. P. Marcus and will improve and operate a plant already in existence.

The Caldwell Cotton Oil Company, Vicksburg, Miss., recently reported as having plans for a mill, has postponed the equipment. J. T. Caldwell is president.

C. F. Peterson and others have plans for the equipment of a cooperage plant at Taylorsville, Miss.

The sawmill of John S. Lambert at Monticello, Miss., reported burned with a loss of \$6000 on machinery is to be replaced, it is stated.

J. E. Taylor, Quitman, Miss., is in the market for machinery for the manufacture of excelsior.

The Contractors' Sand & Gravel Company, Baton Rouge, La., is reported in the market for a centrifugal pump and for sand recovering equipment. T. P. Singleary is in charge.

The Lake Charles Veneer Co., Lake Charles, La., has been incorporated with a capital stock of \$10,000 by S. H. Spangler, John B. Kent and others to build a veneer manufacturing plant, and will proceed with the work at once.

The Aromatic Preservative Company, New Orleans, La., has been incorporated with a capital stock of \$50,000 by Charles N. Wogan, David G. Jackson, Charles J. Davis and others and will equip a manufacturing plant.

The American Brewing Company, New Orleans,

La., will replace its present structures and will also install extensive new mechanical equipment.

The Franklin Lumber Company, Winnsboro, La., will build a saw mill for use in developing 4000 acres of timber land.

The Mansfield Hardwood Lumber Company, Winnfield, La., will equip a saw mill of 30,000 ft. daily capacity.

The Dunham & Robinson Lumber Company, Boyce, La., will build a mill to develop a large hard wood tract.

The city of Lafayette, La., has plans for the improvement of its electric light system at a cost of about \$10,000 for new equipment. J. O. Herpin is superintendent.

The Ragley Lumber Company, Yelgar, La., is planning the erection of a large mill near Fulton, La. J. M. and R. L. Ragley are interested.

Texas

AUSTIN, TEXAS, September 27, 1913.

Much new construction work is in prospect in different towns and cities, and a winter of unusual activity in building is promised. The machinery and tool trade continues very satisfactory.

The Andy Gin & Mill Company will erect a cotton gin and grist mill at Andy. C. L. Davis is interested.

The Texas Bitulithic Company, Dallas, which operates bitulithic paving plants in a number of towns of Texas and the Southwest has increased its capital stock from \$400,000 to \$600,000.

The Timpson Compress Company, Timpson, has been organized with a capital stock of \$30,000 for the purpose of erecting a cotton compress. The incorporators are Tom B. Owens, H. P. Boyd, of Fort Worth, and T. P. Rutherford, of Timpson.

The Pharr Electric Light & Power Company will construct an electric light and power plant at Pharr. A. J. McColl, Kansas City, Mo., is interested.

G. B. Brieger will install a number of new wood-working machines in his woodworking plant at Taylor.

Bonds in the sum of \$22,500 have been issued for the construction of additions to the municipal waterworks plant at Waxahachie.

Bonds have been issued at Whitesboro for improvements to the municipal electric light plant.

The Pendleton Water Company will construct a waterworks plant and distributing system at Pendleton. W. W. Littlefield is interested.

J. F. Dickson will erect a factory at San Marcos for making a cotton cleaner.

The San Angelo Foundry & Machine Company, San Angelo, has purchased for its machine shop an engine lathe, a planer and a gear cutter. The company is also building a welding and blacksmith shop, 30 x 50 ft.

In order to provide for needed extensions and improvements the Galveston-Houston Electric Company plans to increase its common stock from \$3,000,000 to \$4,000,000. It intends to install new electric equipment in the power station, extend the tracks of the company in Houston and Galveston and construct branch lines of the interurban road that connects Houston and Galveston.

Birmingham

BIRMINGHAM, ALA., September 29, 1913.

Machinery dealers report a quieter week the last of September than in some time, but underlying conditions continue good and the volume of inquiry evidences good trading to come. General satisfaction prevails.

The Caruthers-Irwin Shoe Company, Birmingham, Ala., will have a daily capacity of 1000 pairs of shoes in the factory which it proposes establishing with aid of St. Louis and Nashville men at Birmingham. The investment, it is reported, will approximate \$1,000,000.

The City of Tuscaloosa, Ala., will expend \$100,000 for an extension to the waterworks system.

Henry Deal, Columbia, Ala., and R. L. Crawford, Dothan, Ala., are proceeding with the construction of a hydroelectric plant on the Omussee Creek. The power will be used in operating cotton gins and other industries at Columbia and for electric lighting, etc., at Ashford, Ala.

The Lynchburg Foundry Company, Anniston, Ala., which is completing a water pipe plant, proposes to add a plant for the manufacture of pipe cores out of pine tree refuse instead of hay. The company owns the Radford Pipe Works, Radford, Va., and the McWane Pipe Works, Lynchburg, Va.

The City Council of Alabama City, Ala., has granted

a franchise to the Alabama City, Gadsden & Attalla Railroad for electric lighting, and plans for a waterworks system have been ordered drawn. Dr. D. A. Burns is mayor.

The Southern Package Mfg. Company, Macon, Ga., has been incorporated with a capital stock of \$100,000 by B. H. Edwards, F. P. Mansfield and Minter Wimberley, to manufacture crates, boxes and barrels.

J. N. Bray, Valdosta, Ga., has bought 6000 acres of timber land and will build a tram road, sawmill, etc.

The Atlanta Ice & Coal Company, Atlanta, Ga., contemplates enlarging its plant and establishing additional cold storage.

The plant of the Florida Hickory Wagon Works at Tallahassee, Fla., owned by W. H. Atkinson and L. C. Yeager, has been burned with a loss of \$10,000.

Bids will be received by W. M. Boswick, Jr., chairman, Jacksonville, Fla., until October 6, for a pumping engine.

Bids will be received by W. N. Potter, clerk, Bushnell, Fla., until October 6, for a waterworks system.

F. M. Rivers will establish a corn products mill at Lake Butler, Fla.

H. B. Carter will probably establish a sawmill in the place of one burned with a loss of \$50,000 at Carter's, Fla.

A cold storage plant will be established at Miami, Fla., by Genntison Bros.

The Pacific Coast

PORTLAND, ORE., September 26, 1913.

The usual scattered business in single tools and small groups is holding up well, and, while no notably large lists have appeared lately, some heavy tools are being sold. Business in other lines of equipment is fair, but the bulk of individual orders are small. No appreciable improvement is noted as yet in the lumber trade, and orders are coming out rather slowly for new mill and logging development, though there is still considerable business from projects started earlier in the year. Many shops in the lumber districts are also getting a good volume of repair work. Municipal and harbor improvement work is giving rise to considerable business in dredging and excavating machinery, as well as pumping and electric generating units. Some preliminary figuring is being done on mining machinery for Alaska, in which considerable business is expected, and occasional orders are coming from mining districts nearer at hand. The development of Puget Sound fisheries has resulted in great activity in boat-building, and it is reported that boat orders in sight for the coming season amount to about \$1,000,000, most of the boats having gasoline power.

The Northwest Steel Company, Portland, has purchased a seven-acre tract at the foot of Sheridan street, with a river frontage of 320 ft., and is starting work on a \$20,000 dock, to be completed about February 1, when the entire plant will be moved from its present location.

John Kiernan is putting up a new machine shop on First street, between Oak and Pine streets, this city.

The Erie City Iron Works, Erie, Pa., has opened an office at 55 First street, Portland, in charge of E. G. Gordon.

L. A. Marsh, Builders' Exchange, Portland, is taking figures on a number of machine tools for mines. The list includes several lathes, shapers, drill presses, planers, etc.

The Hazel T. Mining Company, operating near Spokane, Wash., has installed a lumber mill and has completed plans for a concentrating plant.

Plans are rapidly progressing for the new \$100,000 factory to be erected by the Northwestern Woodenware Company at Dock and Twenty-ninth streets, Tacoma, Wash., to replace the structure destroyed by fire a short time ago.

The plant of the Heffernan Drydock Company, Seattle, Wash., will be formally taken over by the Seattle Construction & Drydock Company on October 14. It is announced that the plant will thereafter be operated under the name of the Puget Sound Ship Repairing Company, recently incorporated.

The town of Eatonville, Wash., is taking figures on a hydroelectric plant, including turbine and generating equipment.

The Automatic Pump Company, Olympia, Wash., has been incorporated with a capitalization of \$200,000 by Charles A. Whipple, Fred C. Dahlin and Mark Dahlin, of Spokane.

It is reported that M. B. Lewis has taken a site at Richmond, Cal., intending to build an assembling plant for gas stoves.

According to a report from Salt Lake City, Utah, the Hercules Powder Company is preparing to build a \$250,000 dynamite plant near that city.

Eastern Canada

TORONTO, ONT., September 29, 1913.

The Upper St. Lawrence Power Company, Ltd., Toronto, has been incorporated with a capital stock of \$3,000,000 to develop and distribute power.

Fire damaged the building and plant of the Davis Drydock Company, Kingston, Ont., shipbuilder, to the extent of \$4000.

The London Foundry Company, London, Ont., has been taken over by a number of Montreal and St. Catharines capitalists, and will be considerably enlarged. Ernest Grobbs, St. Catharines, is president and managing director, and William P. Kearney, Montreal; F. W. McLean, St. Catharines; David J. Cowan and Joshua Garratt, London, are other directors. The company will manufacture hardware supplies, automobile parts, etc.

Western Canada

WINNIPEG, September 27, 1913.

A steady volume of comparatively small orders is being booked by the different houses, and considerable shipments of various lines are coming in from the East and South. Reports from British Columbia indicate a satisfactory demand there for mining machinery, and many lumber mills are good buyers of machinery parts. Flour mills in the prairie country are doing considerable repair work. There is a moderate movement of machinery for new manufacturing plants.

Negotiations are under way in Vancouver, B. C., for the establishment of a factory by the Kelly Springfield Tire Company.

A report from London, England, says that J. G. White & Co., Ltd., engineers, announce that they have secured the contract for a project of harbor extension at Vancouver, B. C., where the provincial government recently granted foreshore rights to the Vancouver Harbor & Dock Extension Company.

C. E. McQuaid, Regina, Sask., acting for a United States company, is negotiating with the Regina City Council for a franchise to build a gas plant.

The town of Souris, Man., has passed a by-law providing for a lighting system. W. J. Breaky is clerk.

A fire at Milestone, Sask., totally destroyed the International elevator and a private elevator owned by O. X. Wilson, Milestone.

The contract has been let to the Canadian Crocker Wheeler Company, St. Catharines, Ont., for motors and electric apparatus for the Grand Trunk Pacific shops, Transcona, Man. The contract price is \$26,500.

Government Purchases

WASHINGTON, D. C., September 25, 1913.

The paymaster-general of the navy will open bids October 7, schedule 5847, Construction and Repair, class 24, for furnishing one electrically driven, non-reversible, light, portable winch for Brooklyn; alternate, with inspection at the point of delivery.

Bids will be received at the United States Engineer Office, Wilmington, N. C., until October 25 for lock gates. Address H. W. Stickle, major, engineers.

Bids will be received at the office of the supervising architect of the Treasury Department, Washington, until October 7 for the installation, complete, of a new electric elevator plant and a hydraulic pumping plant in the post office at Brooklyn, N. Y.

Bids will be received by the Bureau of Supplies and Accounts, Navy Department, Washington, until October 14, schedule 5876, for a sawdust and shaving collecting outfit for Portsmouth; until October 28, schedule 5893, for generator sets for Puget Sound and for electric traveling cranes for Philadelphia; until November 4, schedule 5886, for a steering engine for Mare Island.

Bids were received by the U. S. Reclamation Service, Los Angeles, Cal., under advertisement No. 224, for pumping units for the Salt River project, the unit to consist of three 1½-in. pumps, direct-connected motors, as follows:

Byron Jackson Iron Works, Los Angeles, Cal., \$564, weight 500 lb., time 30 days; General Electric motor; delivery at West Berkeley, Cal.

C. F. Braun & Co., San Francisco, Cal., \$573, weight 575 lb. each, time 40 days; Alberger pump and 2-hp. General Electric motor; delivery at Newburgh, N. Y.

United Iron Works, Los Angeles, Cal., delivery at Oakland, Cal., \$589, weight 600 lb., time 30 days; 2-hp. General Electric motor.

Bids were received September 17, under advertisement No. 228, for a vertical pumping unit for the Truckee-Carson project, being a re-advertisement of No. 225, original date of opening September 11:

Byron Jackson Company, Los Angeles, Cal., shipping point, delivery at West Berkeley, Cal., \$839, with 10-hp. motor; deduct \$40.47 for 7½-hp. motor; delivery at West Berkeley, 70 days.

United Iron Works, Los Angeles, Cal., \$893, with 7½-hp. motor, Solenoid starter, 75 days; delivery at Los Angeles, Cal.; weight 4500 lb.; or \$760 with 7½-hp. motor, Schureman float switch starter, 75 days, weight 4100 lb.

Transmission Machinery a Staple Line*

The old idea about machinery was that every piece was a special product, made to fit the place where it was to go, and generally unfit to go anywhere else. This was true, not only of tools, and other operative machines, but also of such simpler things as shafting, hangers, couplings, pulleys, etc. Shafting was turned out of round iron to sizes which would clean up all right, and the pulleys which were to go on that particular length were bored to fit. If a new pulley was wanted later, the shop foreman calipered the place where it was to go and filed a piece of wire to fit the calipers, and sent this along with the order, so that the new pulley might be bored to correspond to this particular location. The idea of being able to transpose anything about the shop was not considered, and in general the equipment was as local as the building in which it was installed, and usually such a transmission was tinkered along so that it lasted until the whole establishment was reconstructed at some later date. Those were the days of the millwright and his gang, of the men who came into a place and constructed the power transmission equipment on the spot, and who made things to fit the places that they found and got the power to points where it was needed at the moment.

The millwright is needed occasionally today, and when he is wanted it is sometimes very difficult to find him, because his trade has become almost obsolete and his occupation nearly gone. The need for his work has largely been supplanted by the fact that almost all that he used to build on the spot, in the old days, is now manufactured in quantity, according to standardized designs and proportions, rendering it possible to lay out a transmission system beforehand and purchase all the parts out of stock. This means that such things as shafting, pulleys and all the rest of a transmission equipment have become almost staple articles of commerce, made to gauge dimensions, designed for maximum efficiency, both in operation and handling, and capable of purchase from manufacturers or dealers without the delays accompanying specification and special orderings.

It is true, of course, that even of standardized articles there are various grades and values of articles intended for similar service, just as in the case of older staples, and it is necessary for the critical user to employ his judgment in the selection of his equipment, taking into account the proper relation of the machinery to the work and the probable life of the job.

In some cases it is essential to inspect and examine carefully every piece which is offered, particularly when there are differences in design and manufacture. In other instances it is safe to select from the stock of manufacturers who have themselves become standard makers and even standard bearers, since this simply means the acceptance of the specialized work of engineers who have worked over the subject and put into their product the results of experience and ability. In this respect the purchase of staple machine parts does not differ greatly from that of other kinds of merchandise, and the dependence which is placed upon a manufacturer's reputation is about the same in both cases.

It must not be assumed that absolute standardization is desirable, even in such material as transmission machinery, since any hard-and-fast rules act here, as in other cases, to hold the art in rigid shackles and impede its development and improvement. The true principles of standardization include such carefully selected points as are essential to obtain the advantages of interchangeability, of repetition in manufacture, and of efficiency in erection and operation, while leaving open the way for continual development and progress.

*By C. R. Trowbridge, Dodge Mfg. Company, Mishawaka, Ind.

Trade Publications

Punch Press Guard.—Hardware Supply Company, Grand Rapids, Mich. Leaflet. Describes a safety guard for punch presses, which was illustrated in *The Iron Age*, June 12, 1913. This guard consists of four parts and the operating chain, and the arrangement of the various parts of the guard is clearly indicated in an engraving. A brief description of the way in which guard operates is also given.

Screw Machinery.—National-Acme Mfg. Company, Cleveland, Ohio. Catalogue. Size, 8½ x 11 in.; 77 pages. Gives a brief description of the development of screw machinery. The company's standard automatic screw machines are shown, and the operation of the various parts carefully illustrated and explained. Emphasis is placed on the fact that the forming, drilling and threading is performed in one operation, all of the tools working on the piece simultaneously. Various tools and attachments are also shown. The products of the machine are reproduced both by halftones and line cuts. An interesting feature is a plan giving the floor and overhead space necessary for the machines and a diagram showing the proper arrangement of grouping.

Screw and Drop Forged Wrenches.—Whitman & Barnes Mfg. Company, Akron, Ohio. Folder. Illustrates a line of screw and drop forged wrenches. Special emphasis is put on sets of general purpose wrenches, packed in rolls or boxes.

Oxy-Acetylene Welding.—George C. Schemmel, Wapakoneta, Ohio. Pamphlet. Treats of an oxy-acetylene welding machine, which is very compact and is mounted in a wheeled box for transportation around the shop. In addition to a brief description of the machine, which was illustrated in *The Iron Age*, June 12, 1913, a number of engravings of repairs made by it are included.

Electric Arc Attachment.—Dyer Flaming Arc Company, 225 North Tenth street, Philadelphia, Pa. Folder. Illustrates the Superior flaming arc attachment, which is designed to convert an ordinary arc lamp into a unit of the flaming type. It is claimed to increase the candlepower without increasing the current consumption, besides requiring no change in the mechanism of the lamp. This attachment is applicable to any type of inclosed arc lamp. An illustrated description of this attachment appeared in *The Iron Age*, September 4, 1913.

Drill Chucks.—Standard Tool Company, Cleveland, Ohio. Catalogue No. 21. Illustrates a line of standard and special chucks. Attention is called to the fact that the standard chuck has no projecting jaws, and that the plate prevents the use of larger work than the chuck is designed for. Illustrations are given of the arbors required for use in connection with the chucks. These arbors are designed to enable the use of the chucks on any regular upright drilling machine or engine lathe.

Steam Traps.—Nashua Machine Company, 127 Federal street, Boston, Mass. Pamphlet. Calls attention to the various types of Bundy steam traps, which are used for feeding boilers, returning condensation to boilers, relieving steam mains and heating coils, protecting property and generally increasing the efficiency of steam using apparatus. All of the various types of traps are illustrated and briefly described, and in a number of cases there are line drawings and halftone engravings showing how the different traps are installed. After a description of the several devices, tables of specifications are given, followed by a number of line drawings and dimension tables. Directions for adjusting the traps and the valves are given, together with an illustrated list of repair parts and several tables of useful information.

Steel Flooring Strips.—Stanley Works, New Britain, Conn. Folder. Treats of a new form of factory floor, comprising the use of a metal strip placed between narrow boards, the wood resting on the turned-over flanges of the metal. Long wearing qualities are claimed and it is stated that large loads may be pulled easier over this type of flooring than over ordinary wooden flooring. These strips and their installation were illustrated in *The Iron Age*, September 4, 1913.

Steam Meter.—Steam Appliance Company, 565 Washington boulevard, Chicago, Ill. Mailing card. Calls attention to a portable steam meter. It is claimed that it may be attached to any size of pipe, can be read at all pressures and under all conditions of operation, and that it is easily installed. Attention is called to its light weight, easy portability and to a tabular attachment intended to facilitate calculation.

Rivet Forges.—Improved Appliance Company, 455 Kent avenue, Brooklyn, N. Y. Bulletin No. 200. Illustrations and descriptive matter explain the operation of a line of rivet heating forges which can be supplied either with or without a motor-driven blower. The special feature claimed for these forges, which were illustrated in *The Iron Age*, June 19, 1913, is that oxidation and the formation of scale on the rivets is entirely prevented. Views of the forge, both with and without the blower, are given, together with a condensed specification table.

Heavy Duty Radial Drill.—Fosdick Machine Tool Company, Cincinnati, Ohio. Loose-leaf circular. Relates to a 3-ft. heavy-duty radial drill, illustrated in *The Iron Age*, July 31, 1913.

Vacuum Oil Separators.—Harrison Safety Boiler Works, North Philadelphia station, Philadelphia, Pa. Section D of Separator Catalogue. Illustrates separators for removing oil from exhaust steam under vacuum conditions. Information on the general subject of removing oil from exhaust steam and from condensed water is also given. The mechanical method of removing the oil from steam before it is condensed, by means of oil separators, is recommended, and it is claimed that less than one-fourth to one-half grain of oil appears in a gallon on the condensate, provided oil of a suitable quality is employed.

Electric Drills.—Standard Electric Tool Company, Cincinnati, Ohio. Bulletin D-9, superseding bulletin D-8, and Bulletin D-A-10, superseding bulletin D-9. The first bulletin illustrates a high power, direct-current portable electric drill, which is built on the unit plan, consisting of five simple units, which can be easily dismantled without disturbing any electrical connections. The second bulletin calls attention to high power two and three-phase alternating current drills, similar in many ways to the direct-current drills.

High Grade Steels.—Philadelphia Steel & Forge Company, Tacony, Philadelphia, Pa. Booklet. Illustrates a large line of special steels and gives tests and special uses for each kind and quality of steel listed. Various grades of carbon steel, both crucible and open-hearth, as well as natural and special alloy steels, are listed among the company's products. Illustrations of processes of manufacture and of testing are given. Interesting information in regard to heat treating and temperatures and useful rules and tables, together with an index, are included.

Abrasive Material.—Charles H. Besly & Co., 118-124 North Clinton street, Chicago, Ill. Mailing card. Announces the marketing of a new grinding disk for use on all makes of disk grinders, which is claimed to grind practically any metal rapidly and economically. A sample of Boxite, the name of the company's abrasive product, is attached.

Taps, Dies, Screw Plates.—Superior Tap Company, Charlestown, N. H. Catalogue No. 4. Illustrates the complete line of the company's products. Full mounted sets of screw plates are listed, and the line includes taps, reamer wrenches and stocks for dies. A page treats of thread standards, such as the United States, Acme and British standards. The different standards are illustrated by cross-section cuts and formulas are given.

Chucks.—Skinner Chuck Company, New Britain, Conn. Catalogue and price list and loose leaf circular. Treats of a line of independent, universal and combination chucks, which includes some new emery wheel bushing chucks. Emphasis is placed on the convenience of rebushing the arbor holes in such wheels to any desired size. The circular treats of the Jarvis precision drawing-in chuck, designed to take the place of a drawing-in spindle on engine lathes and arranged to be used on milling, grinding and other machines. It is claimed that work can be located by this chuck without the use of buttons.

Internal Combustion Engine.—St. Mary's Machine Company, St. Mary's Ohio. Bulletin No. 52. Relates to an internal combustion engine which will use any kind of fluid oil as fuel. A number of views of the engine are given to show the variety of sizes and styles in which it is built, together with sectional views of the various parts. An illustrated description of this engine, in which the light hydrocarbons are separated from the heavier parts of the oil by a distillation process which is carried on independently for each suction stroke, appeared in *The Iron Age*, June 19, 1913.

Pneumatic Hand Drills and Portable Air Compressors.—Chicago Pneumatic Tool Company, Fisher Building, Chicago, Ill. Bulletin No. 148. Deals with a pneumatic valveless hand drill and supplies such as drill steels, air hose, etc., and a portable gasoline engine driven air compressor for supplying the required air. The special features of the drill, such as low cost of maintenance, rapid production and simplicity of construction, are touched upon, together with some interesting drilling records which have been made by this tool, the text being supplemented by views of the drill at work in a number of different localities. A brief description and views of the compressor are given, together with a condensed table of specifications.

Vacuum Pumps.—Beach-Russ Company, 220 Broadway, New York City. Loose-leaf folder. Illustrates an electrically driven rotary vacuum pump to be used in connection with vacuum heating systems. It is claimed that this pump runs noiselessly. It is simple in construction, and made of monel metal, which is non-corrosive. The gears run in an oil-dust-proof cast-iron case. The pumps are equipped for either belt drive or for direct connection to motors with rawhide pinion. Special attention is called to the fact that the pumps have no wearing parts on the inside.

Gas Engines.—Mesta Machine Company, Pittsburgh, Pa. Folder. Describes Mesta gas engines. It states that the company builds gas engines for any class of service and for any fuel gas, such as producer gas, blast furnace gas, coke oven or natural gas, and in sizes from 350 hp. upward. Details of the construction of Mesta gas engines are given, together with illustrations of installations made by the company in the power plant of Wickwire Brothers at Cortland, N. Y., and in a large power plant at Sistersville, W. Va.

